

Appointment

---

**From:** Murphy, Tina [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=03e381b938cd4b279e8da793984c33f1-Murphy, Tina]  
**Sent:** 10/26/2018 4:17:50 PM  
**To:** Dunham, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9444681441e4521ad92ae7d42919223-SDUNHAM]; Krieger, Jackie [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9b5c0c79be3c4821baf10ab9cf823e82-JKrieger]; Gunning, Paul [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=f65040017f05429aa05572f096a50463-PGUNNING]; Kocchi, Suzanne [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bd05a97675954ea084bf5eed8b54ee2f-SKOCCHI]; Fawcett, Allen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c42c443c02834519bd99d9826afccf54-AFAWCETT]; Birnbaum, Rona [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3e09449084a84b05bc34f43b76ca8dbc-RBIRNBAU]; Irving, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=7056450189224b4daf3e399831fb0f8b-BIRVIN02]  
**BCC:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=user788a1352]  
**Subject:** Pre-brief on IPCC 1.5C Special Report  
**Attachments:** Meeting Request for Bill Wehrum  
**Location:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP  
**Start:** 11/15/2018 4:00:00 PM  
**End:** 11/15/2018 5:00:00 PM  
**Show Time As:** Busy

**\*\*NOTE\*\*:** Below is when the meeting is scheduled with Bill Wehrum.

-----Original Appointment-----

**From:** Wehrum, Bill  
**Sent:** Friday, October 26, 2018 11:31 AM  
**To:** Wehrum, Bill; Gunasekara, Mandy; Dunham, Sarah; Krieger, Jackie; Gunning, Paul; Kocchi, Suzanne; Fawcett, Allen; Birnbaum, Rona; Irving, Bill  
**Subject:** IPCC 1.5C Special Report  
**When:** Monday, November 26, 2018 1:00 PM-2:00 PM (UTC-05:00) Eastern Time (US & Canada).  
**Where:** WJC - N 5400

Message

---

**From:** Murphy, Tina [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=03e381b938cd4b279e8da793984c33f1-Murphy, Tina]  
**Sent:** 10/25/2018 8:35:18 PM  
**To:** Rakosnik, Delaney [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=274573739a9f446883072599086ededd-Rakosnik, D]  
**CC:** Fawcett, Allen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c42c443c02834519bd99d9826afccf54-AFAWCETT]; Krieger, Jackie [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9b5c0c79be3c4821baf10ab9cf823e82-JKrieger]; Clarke, Deirdre [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bd477de57edf406c8bdb6a175daa5062-Clarke, Dei]; Kocchi, Suzanne [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bd05a97675954ea084bf5eed8b54ee2f-SKOCCHI]  
**Subject:** Meeting Request for Bill Wehrum  
**Attachments:** Meeting Request for William Wehrum.docx

Hi Delaney,

Please find a meeting request attached to brief Bill on the IPCC 1.5C Special Report. Per Allen, he said It sounds like this isn't time sensitive, so he put a wide range for possible dates on the form from 11/5 to 11/30. However, Allen will be out of the office 11/8-9 and 11/19-23. Please let us know if you have any questions what so ever.

Thank you as always for your help,

Tina

<b>OAD Meeting Request Form</b> <b>For William Wehrum</b>
--

**Date of this Request:** 10/25/2018

**Scheduling Point of Contact:** Tina Murphy

**Technical Point of Contact:** Allen Fawcett

**Subject:** IPCC 1.5C Special Report

**Purpose:** To brief the Assistant Administrator on the recent IPCC Special Report on Global Warming of 1.5°C and how it might be used moving forward.

**Next ADP Milestone:**

- If applicable, due date to: OP \_\_/\_\_/\_\_ ( \_ days review); OMB: \_\_/\_\_/\_\_ ( expected date of OMB clearance);
- Legal deadline: (specify court-ordered, settlement agreement, court promise, etc.)
- Other firm deadline:

**First possible date for meeting:** 11/5/2018

**Last possible date for meeting:** 11/30/2018

**Duration:** 1 hour

**Requested Audio / Video** (*Mark with "X" if requested*)

\_\_\_\_\_ **Video Location(s):**

*List video locations needed (e.g., RTP, DC, Regions) – HQ will set up a bridge if needed*

\_\_\_\_\_ **HQ Conference Line:**

*If requested, HQ staff will provide in meeting invite*

**Invitees (please list by Office and in Outlook format, e.g. Last, First):**

*Please include the key OGC and/or Regional representatives as appropriate. Only key invitees are listed by office; others are Cc:*

<u>Office/Org</u>	<u>Name (Last, First)</u>
OAR	Wehrum, William
OAR	Gunasekara, Mandy
OAR	Dunham, Sara
OAR	Krieger, Jackie
OAR	Gunning, Paul
OAR	Kocchi, Suzanne
OAR	Fawcett, Allen
OAR	Birnbaum, Rona
OAR	Irving, William

HQ Meeting Briefing Materials: Must provide to OAR IO by 4:00pm, 1 day before meeting

Appointment

---

**From:** Irving, Bill [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=7056450189224B4DAF3E399831FB0F8B-BIRVIN02]  
**Sent:** 10/26/2018 4:23:23 PM  
**To:** Dunham, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9444681441e4521ad92ae7d42919223-SDUNHAM]

**Subject:** Tentative: Pre-brief on IPCC 1.5C Special Report  
**Location:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP

**Start:** 11/5/2018 4:30:00 PM  
**End:** 11/5/2018 5:15:00 PM

**Recurrence:** (none)

Appointment

---

**From:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=USER788A1352]  
**Sent:** 10/26/2018 4:18:01 PM  
**To:** Dunham, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9444681441e4521ad92ae7d42919223-SDUNHAM]  
**Subject:** Tentative: Pre-brief on IPCC 1.5C Special Report  
**Location:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP  
**Start:** 11/5/2018 4:30:00 PM  
**End:** 11/5/2018 5:15:00 PM  
**Recurrence:** (none)

**Your request was received and is pending approval.**

---

FUTURE - Awaits Construction - Can be reserved by OAR-OAP-IO , while Other in OAR-OAP All go thru Room Owners Tina/Dorothy

---

Sent by Microsoft Exchange Server 2016

Appointment

---

**From:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=USER788A1352]  
**Sent:** 10/26/2018 4:35:22 PM  
**To:** Dunham, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9444681441e4521ad92ae7d42919223-SDUNHAM]  
**Subject:** Tentative: Pre-brief on IPCC 1.5C Special Report  
**Location:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP  
**Start:** 11/15/2018 6:00:00 PM  
**End:** 11/15/2018 7:00:00 PM  
**Recurrence:** (none)

**Your request was received and is pending approval.**

---

FUTURE - Awaits Construction - Can be reserved by OAR-OAP-IO , while Other in OAR-OAP All go thru Room Owners Tina/Dorothy

---

Sent by Microsoft Exchange Server 2016

Message

---

**From:** Murphy, Tina [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=03E381B938CD4B279E8DA793984C33F1-MURPHY, TINA]  
**Sent:** 10/26/2018 3:57:38 PM  
**To:** Dunham, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9444681441e4521ad92ae7d42919223-SDUNHAM]  
**Subject:** IPCC 1.5C Special Report

Sarah,

IPCC 1.5C Special Report is scheduled for Thursday, November 8, 2018 2:00 p.m. - 3:00 p.m. I notice you have recorded "Hold" on your calendar.

Does this time work for you?

Thanks, Tina

## Message

**From:** Edwards, Jonathan [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=3715BC4DFC3E4D6CAF3AF1BF2FC5CA77-JEDWAR02]  
**Sent:** 10/9/2018 8:05:19 PM  
**To:** Dunham, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9444681441e4521ad92ae7d42919223-SDUNHAM]; Rosenberg, Julie [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=343dedf20f904c5db9a5530cb69cc966-Rosenberg, Julie]  
**Subject:** FW: IPCC ...

FYI—not sure if this is helpful to you or not, however ... I received this unsolicited email from a group called “Third Way,” which EPA has worked with several years back at a conference promoted by Carol Browner (early Obama years)---if you don’t know them they are basically pro-nuclear/clean energy... note the IPCC briefing report on the Hill this Thursday and weblink... Jon

---

**From:** Jared DeWese [mailto:jdewese@thirdway.org]  
**Sent:** Tuesday, October 09, 2018 3:34 PM  
**To:** Edwards, Jonathan <Edwards.Jonathan@epa.gov>  
**Subject:** IPCC: Stay Hopeful and Fight like Hell

Hey Jonathan,

The Intergovernmental Panel on Climate Change’s (IPCC) new report is both grim and dense, so we put together a [super short memo](#) we think might help you incorporate the report into your boss’ climate messaging in a productive way.

Also, your energy LA hopefully received an invitation to our briefing on the IPCC report later this week, but you’re of course welcome to attend as well. It’s **Thursday at 2:30** in **Cannon 121**. RSVP [here](#).

If you’d like to spread the word on social media, here’s the link to tweet and some content to share:

<https://www.thirdway.org/op-ed/3-reasons-for-hope-in-the-ipccs-new-climate-report>

<https://twitter.com/LindseyNWalter/status/1049722543656103937>



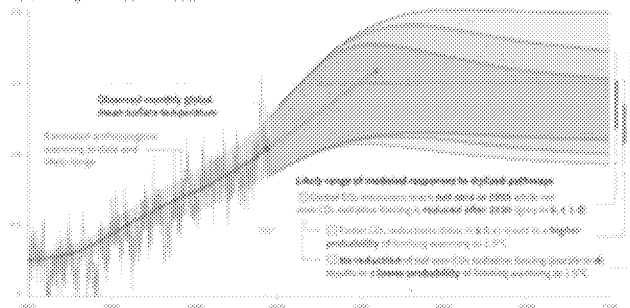
**Lindsey Walter** @LindseyNWalter · 1h

1) We're not too late... yet. We still have the opportunity to stay below 1.5°C. Emissions thus far won't push us past this mark, but do get us close. What happens next is up to us. [report.ipcc.ch/sr15/pdf/sr15\\_...](https://report.ipcc.ch/sr15/pdf/sr15_...)

**Cumulative emissions of CO<sub>2</sub> and future non-CO<sub>2</sub> radiative forcing determine the probability of limiting warming to 1.5°C**

a) Observed global temperature change and modeled responses to stylized anthropogenic emission and forcing pathways

Global warming relative to 1850-1880 (°C)



1 1 3

Let me know if you have any questions, and to talk more this week.

**Jared DeWese**

Clean Energy Press Advisor :: Third Way

202.384.1737 direct :: 202.427.3709 mobile

Message

---

**From:** Gunning, Paul [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=F65040017F05429AA05572F096A50463-PGUNNING]  
**Sent:** 10/25/2018 3:41:23 PM  
**To:** Dunham, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9444681441e4521ad92ae7d42919223-SDUNHAM]  
**CC:** Krieger, Jackie [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9b5c0c79be3c4821baf10ab9cf823e82-JKrieger]  
**Subject:** FW: Latest TPs and guidance on COP24 - DOS  
**Attachments:** COP-24 Overview.docx; UNFCCC Negotiation Item Descriptions.docx; Tab 1 - US Negotiating Guidance.docx; TPs - high-level - COP24.pdf; COP24 EPA overview 10-25-18 to OAR\_revised.docx

Sarah – Just an FYI on the COP 24 planning. Mandy is talking to State this AM.....

---

**From:** Desai, Mausami  
**Sent:** Thursday, October 25, 2018 11:39 AM  
**To:** Irving, Bill <Irving.Bill@epa.gov>  
**Cc:** Gunning, Paul <Gunning.Paul@epa.gov>  
**Subject:** Latest TPs and guidance on COP24 - DOS

Hi Bill,

In this email, am forwarding all the latest background documents DOS shared in response to my outreach yesterday per recent requests. Integrated their updates/notes into our backgrounder as well so it is current (for now).

As I mentioned, Holly Kirking-Loomis (DOS) called to say she is having a call with Mandy this AM. My understanding is that she'll share latest updates with Mandy, too, including latest TPs. Note - looks like there may be a WH side event early the 2<sup>nd</sup> week organized by DOS, too.

Mausami

---

(Ms.) Mausami Desai  
U.S. EPA, Office of Atmospheric Programs  
(202) 343-9381  
[desai.mausami@epa.gov](mailto:desai.mausami@epa.gov)

## Message

**From:** Perez, Idalia [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=03B7A08FDFBE4934911F17550D78491D-IPEREZ]  
**Sent:** 10/12/2018 5:47:23 PM  
**To:** Air Division Directors and Deputies [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=1b532f2f8468410ca085dc3d6c7d2e4d-Air Division Directors and Deputies]; Air Program Managers - Regions [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=53d431cdeb9a4d72a683ee2311621f63-Air Program]; ORC - Regional Air Managers [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2139d539ac0f4ad0ae114009ff7441ed-ORC - Regio]  
**CC:** Rapp, Steve [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=5c3f8897892a40fc8d2998dc0a1ff10a-Rapp, Steve]; Saltman, Tamara [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9901d215c1e0496698e33501bac501d6-TSALTMAN]; Shaw, Betsy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=31ca1476a7674825a131cb2c0d6c88c8-BShaw03]; Shoaff, John [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=ac16fb09cf2c44adb34a7405dc331532-JShoaff]; Benner, Tim [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3276c33aa89847bd91cb0dc48d8b4825-Benner, Tim]; Dunham, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9444681441e4521ad92ae7d42919223-SDUNHAM]; Lewis, Josh [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b22d1d3bb3f84436a524f76ab6c79d7e-JOLEWIS]; Hyde, Courtney [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b9817dab77e44c898a7a7fb8b82ce353-CHYDE]; Millett, John [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c067caa6c93544f78c26ab08cc567d27-Millett, John]; Hassett-Sipple, Beth [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d330e5992ee74b2d87b652f268374e5a-BHASSETT]; Walters, Margaret [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=406f74d8f760452cb40e0a9d25c95c3b-Walters, Margaret]; Atkinson, Emily [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bb2155adef6a44aea9410741f0c01d27-Atkinson, Emily]  
**Subject:** OAR Lead Region News, Updates & Reminders: 10-12-18  
**Attachments:** Draft EPA EE High Wind Dust Event Guidance\_20181003.pdf; Draft EPA Clarification Memo on Data Mod Methods\_20181009.pdf; childrens\_health\_policy\_reaffirmation\_memo.10.11.18.pdf

Please find the latest version of the Fall ADD Meeting agenda [on SharePoint](#). Let me know if you have additional comments.

Have a nice weekend! -Idalia

# Deliberative Process / Ex. 5

# Deliberative Process / Ex. 5

- IPCC Special Report on Climate Change:** Per a request made during from the United Nations Framework Convention on Climate Change (UNFCCC) when it adopted the Paris Agreement in 2015, the Intergovernmental Panel on Climate Change (IPCC) released *Global Warming of 1.5°C, an IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. The report highlights a number of climate change impacts that could be avoided by limiting global warming to 1.5°C compared to 2°C, or more. For instance, by 2100, global sea level rise would be 10 cm lower with global warming of 1.5°C compared with 2°C. The likelihood of an Arctic Ocean free of sea ice in summer would be once per century with global warming of 1.5°C, compared with at least once per decade with 2°C. Coral reefs would decline by 70-90 percent with global warming of 1.5°C, whereas virtually all (> 99 percent) would be lost with 2°C.

# Deliberative Process / Ex. 5

## Science News

- Impacts of Compound Extreme Weather Events on Ozone in the Present and Future:** Ozone levels greatly increase during extreme weather events, and compound events such as high ozone with a heat wave and stagnation can increase levels further, though emissions reductions could limit the highest levels. As recently published in Atmospheric Chemistry and Physics “Weather Research and Forecasting model coupled with Chemistry” (WRF-Chem) was used to study the effect of extreme weather events on ozone in the US for historical (2001–2010) and

future (2046–2055) periods. The Science to Achieve Results (STAR) researchers, supported by funding from the [SEARCH ACE Center](#) suggest that improving projections of compound events and their impacts on extreme ozone could increase the accuracy of future projections of extreme ozone episodes that have detrimental effects on human health. The full article is available [here](#).

#### Recent EPA News Releases for Air and Radiation

- [Acting Administrator Wheeler Announces Science Advisors for Key Clean Air Act Committee](#); Release Date: 10/10/2018
- [Anheuser-Busch Recognized for Excellence in Green Power Use in 2018 EPA Leadership Awards](#); Release Date: 10/10/2018
- [EPA Honors 2018 Green Power Leaders](#); Release Date: 10/10/2018
- [Children's Health Month: EPA's Commitment to Promoting Healthy Environments Where Children Live, Learn, and Play](#); Release Date: 10/10/2018

#### Upcoming Meetings & Events:

- **NACAA 2018 Fall Meeting:** October 15<sup>th</sup> – 17<sup>th</sup>, Cleveland, Ohio. More information available [here](#).
- **2018 Fall ADD Meeting:** November 6<sup>th</sup> – 8<sup>th</sup>, New York City, New York. More information available [here](#).
- **AAPCA 2018 Fall Business Meeting:** November 13<sup>th</sup> – 15<sup>th</sup>, Raleigh, North Carolina
- **2018 SESARM Fall Air Director Meeting:** November 28<sup>th</sup> – 30<sup>th</sup>, Louisville, Kentucky
- **2018 APM Meeting:** December 4<sup>th</sup> – 6<sup>th</sup>, Research Triangle Park, North Carolina. More information available [here](#).
- **2019 Measurement Technology Workshop:** January 29<sup>th</sup> – 31<sup>st</sup>, Research Triangle Park, North Carolina.
- **AAPCA Spring Business Meeting:** March 25<sup>th</sup> – 27<sup>th</sup>, Baton Rouge, Louisiana

---

Idalia M. Pérez, Ph.D. | OAR Lead Region Coordinator  
 U.S. Environmental Protection Agency – Region 9  
 75 Hawthorne St. (AIR-1), San Francisco, CA 94105  
 P: 415.972.3248 | email: [perez.idalia@epa.gov](mailto:perez.idalia@epa.gov)  
[OAR Lead Region SharePoint Site](#)

**Our mission is to protect human health and the environment.**

Appointment

---

**From:** Kocchi, Suzanne [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=BD05A97675954EA084BF5EED8B54EE2F-SKOCCHI]  
**Sent:** 10/28/2018 11:25:59 AM  
**To:** Dunham, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9444681441e4521ad92ae7d42919223-SDUNHAM]  
**Subject:** Accepted: Pre-brief on IPCC 1.5C Special Report  
**Location:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP  
**Start:** 11/15/2018 4:00:00 PM  
**End:** 11/15/2018 5:00:00 PM  
**Recurrence:** (none)

Appointment

---

**From:** Krieger, Jackie [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=9B5C0C79BE3C4821BAF10AB9CF823E82-JKRIEGER]  
**Sent:** 10/26/2018 6:42:52 PM  
**To:** Dunham, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9444681441e4521ad92ae7d42919223-SDUNHAM]

**Subject:** Accepted: Pre-brief on IPCC 1.5C Special Report  
**Location:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP

**Start:** 11/15/2018 4:00:00 PM  
**End:** 11/15/2018 5:00:00 PM

**Recurrence:** (none)

Appointment

---

**From:** Irving, Bill [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=7056450189224B4DAF3E399831FB0F8B-BIRVIN02]  
**Sent:** 10/26/2018 4:44:51 PM  
**To:** Dunham, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9444681441e4521ad92ae7d42919223-SDUNHAM]

**Subject:** Accepted: Pre-brief on IPCC 1.5C Special Report  
**Location:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP

**Start:** 11/15/2018 4:00:00 PM  
**End:** 11/15/2018 5:00:00 PM

**Recurrence:** (none)

Appointment

---

**From:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=USER788A1352]  
**Sent:** 10/26/2018 4:42:50 PM  
**To:** Dunham, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9444681441e4521ad92ae7d42919223-SDUNHAM]  
**Subject:** Tentative: Pre-brief on IPCC 1.5C Special Report  
**Location:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP  
**Start:** 11/15/2018 4:00:00 PM  
**End:** 11/15/2018 5:00:00 PM  
**Recurrence:** (none)

**Your request was received and is pending approval.**

---

FUTURE - Awaits Construction - Can be reserved by OAR-OAP-IO , while Other in OAR-OAP All go thru Room Owners Tina/Dorothy

---

Sent by Microsoft Exchange Server 2016

Appointment

---

**From:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=USER788A1352]  
**Sent:** 10/26/2018 4:39:52 PM  
**To:** Dunham, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9444681441e4521ad92ae7d42919223-SDUNHAM]  
**Subject:** Tentative: Pre-brief on IPCC 1.5C Special Report  
**Location:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP  
**Start:** 11/15/2018 4:00:00 PM  
**End:** 11/15/2018 5:00:00 PM  
**Recurrence:** (none)

**Your request was received and is pending approval.**

---

FUTURE - Awaits Construction - Can be reserved by OAR-OAP-IO , while Other in OAR-OAP All go thru Room Owners Tina/Dorothy

---

Sent by Microsoft Exchange Server 2016

Appointment

---

**From:** Dunham, Sarah [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A9444681441E4521AD92AE7D42919223-SDUNHAM]  
**Sent:** 10/26/2018 4:17:57 PM  
**To:** Dunham, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9444681441e4521ad92ae7d42919223-SDUNHAM]; Krieger, Jackie [Krieger.Jackie@epa.gov]; Gunning, Paul [Gunning.Paul@epa.gov]; Kocchi, Suzanne [Kocchi.Suzanne@epa.gov]; Fawcett, Allen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c42c443c02834519bd99d9826afccf54-AFAWCETT]; Birnbaum, Rona [Birnbaum.Rona@epa.gov]; Irving, Bill [Irving.Bill@epa.gov]  
**Subject:** Pre-brief on IPCC 1.5C Special Report  
**Attachments:** Meeting Request for Bill Wehrum  
**Location:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP  
**Start:** 11/15/2018 4:00:00 PM  
**End:** 11/15/2018 5:00:00 PM  
**Show Time As:** Busy

**\*\*NOTE\*\*:** Below is when the meeting is scheduled with Bill Wehrum.

-----Original Appointment-----

**From:** Wehrum, Bill  
**Sent:** Friday, October 26, 2018 11:31 AM  
**To:** Wehrum, Bill; Gunasekara, Mandy; Dunham, Sarah; Krieger, Jackie; Gunning, Paul; Kocchi, Suzanne; Fawcett, Allen; Birnbaum, Rona; Irving, Bill  
**Subject:** IPCC 1.5C Special Report  
**When:** Monday, November 26, 2018 1:00 PM-2:00 PM (UTC-05:00) Eastern Time (US & Canada).  
**Where:** WJC - N 5400

Message

---

**From:** Murphy, Tina [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=03E381B938CD4B279E8DA793984C33F1-MURPHY, TINA]  
**Sent:** 10/25/2018 8:35:18 PM  
**To:** Rakosnik, Delaney [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=274573739a9f446883072599086ededd-Rakosnik, D]  
**CC:** Fawcett, Allen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c42c443c02834519bd99d9826afccf54-AFAWCETT]; Krieger, Jackie [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9b5c0c79be3c4821baf10ab9cf823e82-JKrieger]; Clarke, Deirdre [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bd477de57edf406c8bdb6a175daa5062-Clarke, Dei]; Kocchi, Suzanne [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bd05a97675954ea084bf5eed8b54ee2f-SKOCCHI]  
**Subject:** Meeting Request for Bill Wehrum  
**Attachments:** Meeting Request for William Wehrum.docx

Hi Delaney,

Please find a meeting request attached to brief Bill on the IPCC 1.5C Special Report. Per Allen, he said It sounds like this isn't time sensitive, so he put a wide range for possible dates on the form from 11/5 to 11/30. However, Allen will be out of the office 11/8-9 and 11/19-23. Please let us know if you have any questions what so ever.

Thank you as always for your help,  
Tina

Appointment

---

**From:** Murphy, Tina [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=03E381B938CD4B279E8DA793984C33F1-MURPHY, TINA]  
**Sent:** 10/26/2018 4:42:44 PM  
**To:** Krieger, Jackie [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9b5c0c79be3c4821baf10ab9cf823e82-JKrieger]; Gunning, Paul [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=f65040017f05429aa05572f096a50463-PGUNNING]; Kocchi, Suzanne [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bd05a97675954ea084bf5eed8b54ee2f-SKOCCHI]; Fawcett, Allen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c42c443c02834519bd99d9826afccf54-AFAWCETT]; Birnbaum, Rona [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3e09449084a84b05bc34f43b76ca8dbc-RBIRNBAU]; Irving, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=7056450189224b4daf3e399831fb0f8b-BIRVIN02]  
**Subject:** Pre-brief on IPCC 1.5C Special Report  
**Attachments:** Meeting Request for Bill Wehrum  
**Location:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP  
**Start:** 11/15/2018 4:00:00 PM  
**End:** 11/15/2018 5:00:00 PM  
**Show Time As:** Tentative

**\*\*NOTE\*\*:** Below is when the meeting is scheduled with Bill Wehrum.

-----Original Appointment-----

**From:** Wehrum, Bill  
**Sent:** Friday, October 26, 2018 11:31 AM  
**To:** Wehrum, Bill; Gunasekara, Mandy; Dunham, Sarah; Krieger, Jackie; Gunning, Paul; Kocchi, Suzanne; Fawcett, Allen; Birnbaum, Rona; Irving, Bill  
**Subject:** IPCC 1.5C Special Report  
**When:** Monday, November 26, 2018 1:00 PM-2:00 PM (UTC-05:00) Eastern Time (US & Canada).  
**Where:** WJC - N 5400

Appointment

---

**From:** Murphy, Tina [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=03E381B938CD4B279E8DA793984C33F1-MURPHY, TINA]  
**Sent:** 10/26/2018 4:39:47 PM  
**To:** Krieger, Jackie [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9b5c0c79be3c4821baf10ab9cf823e82-JKrieger]; Gunning, Paul [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=f65040017f05429aa05572f096a50463-PGUNNING]; Kocchi, Suzanne [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bd05a97675954ea084bf5eed8b54ee2f-SKOCCHI]; Fawcett, Allen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c42c443c02834519bd99d9826afccf54-AFAWCETT]; Birnbaum, Rona [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3e09449084a84b05bc34f43b76ca8dbc-RBIRNBAU]; Irving, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=7056450189224b4daf3e399831fb0f8b-BIRVIN02]  
**Subject:** Pre-brief on IPCC 1.5C Special Report  
**Location:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP  
**Start:** 11/15/2018 4:00:00 PM  
**End:** 11/15/2018 5:00:00 PM  
**Show Time As:** Tentative

**\*\*NOTE\*\*:** Below is when the meeting is scheduled with Bill Wehrum.

-----Original Appointment-----

**From:** Wehrum, Bill  
**Sent:** Friday, October 26, 2018 11:31 AM  
**To:** Wehrum, Bill; Gunasekara, Mandy; Dunham, Sarah; Krieger, Jackie; Gunning, Paul; Kocchi, Suzanne; Fawcett, Allen; Birnbaum, Rona; Irving, Bill  
**Subject:** IPCC 1.5C Special Report  
**When:** Thursday, November 8, 2018 2:00 PM-3:00 PM (UTC-05:00) Eastern Time (US & Canada).  
**Where:** WJC - N 5400

**TO:** Bill Wehrum, Mandy Gunasekara, Sara Dunham, Jackie Krieger, Paul Gunning, Suzanne Kocchi, Allen Fawcett, Rona Birnbaum, William Irving

Appointment

---

**From:** Murphy, Tina [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=03E381B938CD4B279E8DA793984C33F1-MURPHY, TINA]  
**Sent:** 10/26/2018 4:35:19 PM  
**To:** Krieger, Jackie [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9b5c0c79be3c4821baf10ab9cf823e82-JKrieger]; Gunning, Paul [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=f65040017f05429aa05572f096a50463-PGUNNING]; Kocchi, Suzanne [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bd05a97675954ea084bf5eed8b54ee2f-SKOCCHI]; Fawcett, Allen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c42c443c02834519bd99d9826afccf54-AFAWCETT]; Birnbaum, Rona [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3e09449084a84b05bc34f43b76ca8dbc-RBIRNBAU]; Irving, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=7056450189224b4daf3e399831fb0f8b-BIRVIN02]  
**Subject:** Pre-brief on IPCC 1.5C Special Report  
**Location:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP  
**Start:** 11/15/2018 6:00:00 PM  
**End:** 11/15/2018 7:00:00 PM  
**Show Time As:** Tentative

**\*\*NOTE\*\*:** Below is when the meeting is scheduled with Bill Wehrum.

-----Original Appointment-----

**From:** Wehrum, Bill  
**Sent:** Friday, October 26, 2018 11:31 AM  
**To:** Wehrum, Bill; Gunasekara, Mandy; Dunham, Sarah; Krieger, Jackie; Gunning, Paul; Kocchi, Suzanne; Fawcett, Allen; Birnbaum, Rona; Irving, Bill  
**Subject:** IPCC 1.5C Special Report  
**When:** Thursday, November 8, 2018 2:00 PM-3:00 PM (UTC-05:00) Eastern Time (US & Canada).  
**Where:** WJC - N 5400

**TO:** Bill Wehrum, Mandy Gunasekara, Sara Dunham, Jackie Krieger, Paul Gunning, Suzanne Kocchi, Allen Fawcett, Rona Birnbaum, William Irving

Appointment

---

**From:** Rakosnik, Delaney [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=274573739A9F446883072599086EDED-RAKOSNIK, D]  
**Sent:** 10/26/2018 4:33:02 PM  
**To:** Gunasekara, Mandy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=53d1a3caa8bb4ebab8a2d28ca59b6f45-Gunasekara,]; Dunham, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9444681441e4521ad92ae7d42919223-SDUNHAM]; Krieger, Jackie [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9b5c0c79be3c4821baf10ab9cf823e82-JKrieger]; Gunning, Paul [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=f65040017f05429aa05572f096a50463-PGUNNING]; Kocchi, Suzanne [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bd05a97675954ea084bf5eed8b54ee2f-SKOCCHI]; Fawcett, Allen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c42c443c02834519bd99d9826afccf54-AFAWCETT]; Birnbaum, Rona [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3e09449084a84b05bc34f43b76ca8dbc-RBIRNBAU]; Irving, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=7056450189224b4daf3e399831fb0f8b-BIRVIN02]  
**Subject:** IPCC 1.5C Special Report  
**Attachments:** Meeting Request for Bill Wehrum  
**Location:** WJC - N 5400  
**Start:** 11/26/2018 6:00:00 PM  
**End:** 11/26/2018 7:00:00 PM  
**Show Time As:** Tentative

**TO:** Bill Wehrum, Mandy Gunasekara, Sara Dunham, Jackie Krieger, Paul Gunning, Suzanne Kocchi, Allen Fawcett, Rona Birnbaum, William Irving



Meeting Request  
for Bill Wehrum

Appointment

---

**From:** Murphy, Tina [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=03E381B938CD4B279E8DA793984C33F1-MURPHY, TINA]  
**Sent:** 10/26/2018 4:17:54 PM  
**To:** Krieger, Jackie [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9b5c0c79be3c4821baf10ab9cf823e82-JKrieger]; Gunning, Paul [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=f65040017f05429aa05572f096a50463-PGUNNING]; Kocchi, Suzanne [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bd05a97675954ea084bf5eed8b54ee2f-SKOCCHI]; Fawcett, Allen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c42c443c02834519bd99d9826afccf54-AFAWCETT]; Birnbaum, Rona [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3e09449084a84b05bc34f43b76ca8dbc-RBIRNBAU]; Irving, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=7056450189224b4daf3e399831fb0f8b-BIRVIN02]  
**Subject:** Pre-brief on IPCC 1.5C Special Report  
**Location:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP  
**Start:** 11/5/2018 4:30:00 PM  
**End:** 11/5/2018 5:15:00 PM  
**Show Time As:** Tentative

**\*\*NOTE\*\*:** Below is when the meeting is scheduled with Bill Wehrum.

-----Original Appointment-----

**From:** Wehrum, Bill  
**Sent:** Friday, October 26, 2018 11:31 AM  
**To:** Wehrum, Bill; Gunasekara, Mandy; Dunham, Sarah; Krieger, Jackie; Gunning, Paul; Kocchi, Suzanne; Fawcett, Allen; Birnbaum, Rona; Irving, Bill  
**Subject:** IPCC 1.5C Special Report  
**When:** Thursday, November 8, 2018 2:00 PM-3:00 PM (UTC-05:00) Eastern Time (US & Canada).  
**Where:** WJC - N 5400

**TO:** Bill Wehrum, Mandy Gunasekara, Sara Dunham, Jackie Krieger, Paul Gunning, Suzanne Kocchi, Allen Fawcett, Rona Birnbaum, William Irving

Appointment

---

**From:** Rakosnik, Delaney [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=274573739A9F446883072599086EDED-RAKOSNIK, D]  
**Sent:** 10/26/2018 3:51:37 PM  
**To:** Gunasekara, Mandy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=53d1a3caa8bb4ebab8a2d28ca59b6f45-Gunasekara,]; Dunham, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9444681441e4521ad92ae7d42919223-SDUNHAM]; Krieger, Jackie [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9b5c0c79be3c4821baf10ab9cf823e82-JKrieger]; Gunning, Paul [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=f65040017f05429aa05572f096a50463-PGUNNING]; Kocchi, Suzanne [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bd05a97675954ea084bf5eed8b54ee2f-SKOCCHI]; Fawcett, Allen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c42c443c02834519bd99d9826afccf54-AFAWCETT]; Birnbaum, Rona [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3e09449084a84b05bc34f43b76ca8dbc-RBIRNBAU]; Irving, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=7056450189224b4daf3e399831fb0f8b-BIRVIN02]  
**Subject:** IPCC 1.5C Special Report  
**Attachments:** Meeting Request for Bill Wehrum  
**Location:** WJC - N 5400  
  
**Start:** 11/8/2018 7:00:00 PM  
**End:** 11/8/2018 8:00:00 PM  
**Show Time As:** Tentative

**TO:** Bill Wehrum, Mandy Gunasekara, Sara Dunham, Jackie Krieger, Paul Gunning, Suzanne Kocchi, Allen Fawcett, Rona Birnbaum, William Irving



Meeting Request  
for Bill Wehrum

Appointment

---

**From:** Rakosnik, Delaney [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=274573739A9F446883072599086EDED-RAKOSNIK, D]  
**Sent:** 10/26/2018 3:31:04 PM  
**To:** Gunasekara, Mandy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=53d1a3caa8bb4ebab8a2d28ca59b6f45-Gunasekara,]; Dunham, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9444681441e4521ad92ae7d42919223-SDUNHAM]; Krieger, Jackie [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9b5c0c79be3c4821baf10ab9cf823e82-JKrieger]; Gunning, Paul [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=f65040017f05429aa05572f096a50463-PGUNNING]; Kocchi, Suzanne [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bd05a97675954ea084bf5eed8b54ee2f-SKOCCHI]; Fawcett, Allen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c42c443c02834519bd99d9826afccf54-AFAWCETT]; Birnbaum, Rona [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3e09449084a84b05bc34f43b76ca8dbc-RBIRNBAU]; Irving, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=7056450189224b4daf3e399831fb0f8b-BIRVIN02]  
**Subject:** IPCC 1.5C Special Report  
**Attachments:** Meeting Request for Bill Wehrum  
**Location:** WJC - N 5400  
**Start:** 11/7/2018 7:00:00 PM  
**End:** 11/7/2018 8:00:00 PM  
**Show Time As:** Tentative

**TO:** Bill Wehrum, Mandy Gunasekara, Sara Dunham, Jackie Krieger, Paul Gunning, Suzanne Kocchi, Allen Fawcett, Rona Birnbaum, William Irving



Meeting Request  
for Bill Wehrum

Appointment

---

**From:** Fawcett, Allen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c42c443c02834519bd99d9826afccf54-AFAWCETT]  
**Sent:** 9/17/2018 4:45:11 PM  
**To:** Fawcett, Allen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c42c443c02834519bd99d9826afccf54-AFAWCETT]  
**Subject:** IPCC 1.5 Expert Comm Call  
**Start:** 9/18/2018 6:30:00 PM  
**End:** 9/18/2018 7:30:00 PM  
**Show Time As:** Busy

Hello expert committee,

The Dept of State team would like to touch base with you tomorrow at 2:30 EDT regarding the upcoming IPCC meeting as we prepare for upcoming briefings. Trigg Talley, who will head the delegation in Korea would like to hear about the expected public narrative regarding the report. Please also be prepared to describe any major problems you see in your respective chapters of the underlying report. If you are unable to join the call, please send your relevant remarks via email.

We appreciate your flexibility on short notice, and thank you again for all your hard work.

Best,  
Alice

**Official**  
UNCLASSIFIED

## Message

**From:** Fawcett.Allen@epa.gov [Fawcett.Allen@epa.gov]  
**Sent:** 10/12/2018 5:16:56 PM  
**To:** Gunning, Paul [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=f65040017f05429aa05572f096a50463-PGUNNING]; Irving, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=7056450189224b4daf3e399831fb0f8b-BIRVIN02]; Kocchi, Suzanne [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bd05a97675954ea084bf5eed8b54ee2f-SKOCCHI]  
**Subject:** Fwd: Final Statement following acceptance of the Special Report on Global Warming at 1.5C  
**Attachments:** Statement of the United States of America on the IPCC Special Report on Global Warming of 1.pdf; ATT00001.htm

Here's the final statement.

---

Allen A. Fawcett, Ph.D.  
 Chief, Climate Economics Branch  
 U.S. Environmental Protection Agency  
 Office: (202) 343-9436  
 Cell: (202) 412-5116

Begin forwarded message:

**From:** "Talley, Trigg" <TalleyT@state.gov>  
**Date:** October 7, 2018 at 9:59:43 PM EDT  
**To:** "Fawcett, Allen" <fawcett.allen@epa.gov>, "Haxthausen, Eric M. (E3/GCC/PEL)" <ehaxthausen@usaid.gov>, Benjamin DeAngelo - NOAA Federal <ben.deangelo@noaa.gov>, "Alpert, Alice" <AlpertA@state.gov>, "Akhtar, Farhan H" <AkhtarFH@state.gov>, Stephen Gray <sgray@usgs.gov>, Mike Kuperberg USGCRP <mkuperberg@usgcrp.gov>, David R Reidmiller <dreidmiller@usgcrp.gov>  
**Subject:** **Fw: Final Statement following acceptance of the Special Report on Global Warming at 1.5C**

Can't remember if I sent this to you or not, but here's the final statement we read in plenary and will be including in the record of the meeting. NYT picked up a couple of points but not the whole thing.

**Statement of the United States of America on the IPCC Special Report on Global Warming of 1.5C at the Forty Eighth Session of the Intergovernmental Panel on Climate Change**

October 6, 2018

The United States appreciates the hard work of the scientists and experts who authored the IPCC Special Report on Global Warming of 1.5C under considerable time pressure, and we appreciated our engagement with other members of the Panel to finalize this Special Report, by accepting the report from its authors and approving its Summary for Policy Makers.

With respect to acceptance of the Special Report, as provided in the IPCC's procedures, the contents of the authored chapters have not been subject to line-by-line discussion and agreement, and remain the responsibility of the authors. In this context, the United States notes that acceptance of this report by the Panel does not imply endorsement by the United States of the specific findings or underlying contents of the report.

With respect to approval of the Summary for Policy Makers (SPM), we underscore that, as provided in IPCC procedures, approval signifies that the SPM is consistent with the factual material contained in the full report.

Given that the underlying contents of the report are not subject to agreement by members of the panel, approval of the SPM similarly should not be understood as U.S. endorsement of all of the findings and key messages included in the SPM.

With respect to the report as a whole, several sections of the report acknowledge that literature that relates specifically to impacts at 1.5C is more limited than many other aspects of the climate issue, and that much of the literature assessed is quite recent. We observe that there are a number of inherent limitations in the confidence of modeled results of impacts, costs, and related issues at specific future temperature levels, and more so at the particular levels addressed by this report.

We note that parts of the underlying report were substantially revised following the second order draft, including in a number of cases with new literature made available only after the circulation of that draft, and that these revisions were not subject to full government and expert review.

Finally, in light of references to the Paris Agreement in the Summary for Policy Makers, we reiterate that the United States intends to withdraw from the Paris Agreement at the earliest opportunity absent the identification of terms that are better for the American people.

Message

---

**From:** Fawcett.Allen@epa.gov [Fawcett.Allen@epa.gov]  
**Sent:** 9/30/2018 11:10:17 AM  
**To:** Sarofim, Marcus [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8557a127ac804a9dbb76e8b726eaba09-Sarofim, Marcus]  
**Subject:** Fwd: SPM Sept 30  
**Attachments:** Doc. 2a, Rev. 1 - Final Draft Summary for Policymakers (clean).pdf; ATT00001.htm

Sent from my iPhone

Begin forwarded message:

**From:** "Alpert, Alice" <AlpertA@state.gov>  
**Date:** September 30, 2018 at 6:57:20 PM GMT+9  
**To:** "Akhtar, Farhan H" <AkhtarFH@state.gov>, "Talley, Trigg" <TalleyT@state.gov>, "Gray, Stephen" <sgray@usgs.gov>, "Haxthausen, Eric M. (E3/GCC/PEL)" <ehaxthausen@usaid.gov>, "Fawcett, Allen" <Fawcett.Allen@epa.gov>, 'Benjamin DeAngelo - NOAA Federal' <ben.deangelo@noaa.gov>  
**Subject:** SPM Sept 30

## Message

**From:** Benjamin DeAngelo - NOAA Federal [ben.deangelo@noaa.gov]  
**Sent:** 9/18/2018 8:05:17 PM  
**To:** Talley, Trigg [TalleyT@state.gov]; Alpert, Alice [AlpertA@state.gov]; Akhtar, Farhan H [akhtarfh@state.gov]; Fawcett, Allen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c42c443c02834519bd99d9826afccf54-AFAWCETT]; Haxthausen, Eric M. (E3/GCC/PEL) [ehaxthausen@usaid.gov]; Gray, Stephen [sgray@usgs.gov]; David Dokken [ddokken@usgcrp.gov]  
**Subject:** Re: relevant language from Climate Science Special Report

# Deliberative Process / Ex. 5

On Tue, Sep 18, 2018 at 3:59 PM, Benjamin DeAngelo - NOAA Federal <[ben.deangelo@noaa.gov](mailto:ben.deangelo@noaa.gov)> wrote:  
Hi all,

# Deliberative Process / Ex. 5

<https://science2017.globalchange.gov/chapter/14/>

-----  
Benjamin DeAngelo  
Deputy Director  
NOAA Climate Program Office  
[cpo.noaa.gov](http://cpo.noaa.gov)

301-734-1093 office  
240-750-8243 cell  
[ben.deangelo@noaa.gov](mailto:ben.deangelo@noaa.gov)

--  
-----  
Benjamin DeAngelo  
Deputy Director  
NOAA Climate Program Office  
[cpo.noaa.gov](http://cpo.noaa.gov)

301-734-1093 office  
240-750-8243 cell  
[ben.deangelo@noaa.gov](mailto:ben.deangelo@noaa.gov)

Message

---

**From:** Benjamin DeAngelo - NOAA Federal [ben.deangelo@noaa.gov]  
**Sent:** 9/18/2018 7:59:16 PM  
**To:** Talley, Trigg [TalleyT@state.gov]; Alpert, Alice [AlpertA@state.gov]; Akhtar, Farhan H [akhtarfh@state.gov]; Fawcett, Allen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c42c443c02834519bd99d9826afccf54-AFAWCETT]; Haxthausen, Eric M. (E3/GCC/PEL) [ehaxthausen@usaid.gov]; Gray, Stephen [sgray@usgs.gov]; David Dokken [ddokken@usgcrp.gov]  
**Subject:** relevant language from Climate Science Special Report

Hi all,

Following up on the call, here are relevant findings from CSSR (vol. I of the Nat'l Climate

# Deliberative Process / Ex. 5

<https://science2017.globalchange.gov/chapter/14/>

--  
Benjamin DeAngelo  
Deputy Director  
NOAA Climate Program Office  
[cpo.noaa.gov](mailto:cpo.noaa.gov)

301-734-1093 office  
240-750-8243 cell  
[ben.deangelo@noaa.gov](mailto:ben.deangelo@noaa.gov)

## Message

**From:** Gray, Stephen [sgray@usgs.gov]  
**Sent:** 9/19/2018 9:13:19 PM  
**To:** Fawcett, Allen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c42c443c02834519bd99d9826afccf54-AFAWCETT]  
**Subject:** Re: [EXTERNAL] RE: reminder: IPCC 48 papers by Wed Sept 19  
**Attachments:** A2 aaf 091918 STG wrk ii.docx

Here are my edits to your A2 write-up.

Thanks,  
Steve

Stephen T. Gray, Ph.D.  
Director  
Alaska Climate Adaptation Science Center  
DOI/US Geological Survey  
Anchorage, AK  
Phone: +1-907-301-7830  
[sgray@usgs.gov](mailto:sgray@usgs.gov)

On Wed, Sep 19, 2018 at 9:16 AM, Fawcett, Allen <[Fawcett.Allen@epa.gov](mailto:Fawcett.Allen@epa.gov)> wrote:

Hi Steve,

This sounds like a good approach to me.

**Deliberative Process / Ex. 5**

**Deliberative Process / Ex. 5**

Thanks,

Allen

---

Allen A. Fawcett, Ph.D.

Chief, Climate Economics Branch

U.S. Environmental Protection Agency

Office: (202) 343-9436

Cell: (202) 412-5116

**From:** Gray, Stephen [mailto:[sgray@usgs.gov](mailto:sgray@usgs.gov)]

**Sent:** Tuesday, September 18, 2018 1:57 PM

**To:** Fawcett, Allen <[Fawcett.Allen@epa.gov](mailto:Fawcett.Allen@epa.gov)>

**Subject:** Re: [EXTERNAL] RE: reminder: IPCC 48 papers by Wed Sept 19

Hello Allen-

You are correct, and thanks for getting the ball rolling.

# Deliberative Process / Ex. 5

Regards,

Steve

Stephen T. Gray, Ph.D.  
Director  
Alaska Climate Adaptation Science Center  
DOI/US Geological Survey  
Anchorage, AK  
Phone: +1-907-301-7830  
[sgray@usgs.gov](mailto:sgray@usgs.gov)

On Tue, Sep 18, 2018 at 6:44 AM, Fawcett, Allen <[Fawcett.Allen@epa.gov](mailto:Fawcett.Allen@epa.gov)> wrote:

Hi Steve,

I think we're supposed to coordinate on section A2. Just wanted to share what I have so far.

Thanks,

Allen

---

Allen A. Fawcett, Ph.D.

Chief, Climate Economics Branch

U.S. Environmental Protection Agency

Office: (202) 343-9436

Cell: (202) 412-5116

---

**From:** Alpert, Alice [mailto:[AlpertA@state.gov](mailto:AlpertA@state.gov)]

**Sent:** Monday, September 17, 2018 10:44 AM

**To:** Akhtar, Farhan H <[AkhtarFH@state.gov](mailto:AkhtarFH@state.gov)>; Haxthausen, Eric M. (E3/GCC/PEL) <[ehaxthausen@usaid.gov](mailto:ehaxthausen@usaid.gov)>; 'Gray, Stephen' <[sgray@usgs.gov](mailto:sgray@usgs.gov)>; Fawcett, Allen <[Fawcett.Allen@epa.gov](mailto:Fawcett.Allen@epa.gov)>; 'Benjamin DeAngelo - NOAA Federal' <[ben.deangelo@noaa.gov](mailto:ben.deangelo@noaa.gov)>

**Cc:** David Dokken <[ddokken@usgcrp.gov](mailto:ddokken@usgcrp.gov)>

**Subject:** reminder: IPCC 48 papers by Wed Sept 19

Good morning experts,

# Deliberative Process / Ex. 5

Alice

**Official**

UNCLASSIFIED

---

**From:** Alpert, Alice  
**Sent:** Thursday, September 13, 2018 6:15 PM  
**To:** Akhtar, Farhan H <[AkhtarFH@state.gov](mailto:AkhtarFH@state.gov)>; Haxthausen, Eric M. (E3/GCC/PEL) <[ehaxthausen@usaid.gov](mailto:ehaxthausen@usaid.gov)>; 'Gray, Stephen' <[sgray@usgs.gov](mailto:sgray@usgs.gov)>; 'Fawcett, Allen' <[Fawcett.Allen@epa.gov](mailto:Fawcett.Allen@epa.gov)>; 'Benjamin DeAngelo - NOAA Federal' <[ben.deangelo@noaa.gov](mailto:ben.deangelo@noaa.gov)>  
**Cc:** 'David Dokken' <[ddokken@usgcrp.gov](mailto:ddokken@usgcrp.gov)>  
**Subject:** RE: IPCC 48 preparations

Hello team,

This is a reminder to continue preparing for the IPCC meeting in October. Please do not hesitate to reach with any questions you have.

I am attaching the consolidated comments submitted to the IPCC from governments. These will be important

## Deliberative Process / Ex. 5

I will schedule a call the week of September 24 to make sure we are all prepared for the meeting. (Ben, let's connect next week before you leave)

All the best,

Alice

**Official**

UNCLASSIFIED

---

**From:** Alpert, Alice  
**Sent:** Friday, August 31, 2018 4:28 AM  
**To:** Akhtar, Farhan H <[AkhtarFH@state.gov](mailto:AkhtarFH@state.gov)>; Haxthausen, Eric M. (E3/GCC/PEL) <[ehaxthausen@usaid.gov](mailto:ehaxthausen@usaid.gov)>; 'Gray, Stephen' <[sgray@usgs.gov](mailto:sgray@usgs.gov)>; 'Fawcett, Allen' <[Fawcett.Allen@epa.gov](mailto:Fawcett.Allen@epa.gov)>; 'Benjamin DeAngelo - NOAA Federal' <[ben.deangelo@noaa.gov](mailto:ben.deangelo@noaa.gov)>

**Cc:** David Dokken <[ddokken@usgcrp.gov](mailto:ddokken@usgcrp.gov)>

**Subject:** IPCC 48 preparations

Hello expert team,

We are starting to prepare our arguments and preferred SPM text for the October meeting. I've outlined a process below for preparing our paper for the meeting, noting that another draft of the SPM will be released immediately ahead of the meeting, or possibly on its first day. Some of our comments on the existing version may be addressed in that draft, and there may also be additions from other countries. So, we will need be prepared to respond in either case.

I have prepared several documents to aid in this preparation:

## **Deliberative Process / Ex. 5**

What we are asking you to do is:

## **Deliberative Process / Ex. 5**

We plan to schedule a call to check in and answer questions later this week or next week. Trigg, Farhan, and I will be at a meeting in Bangkok, 11 hours ahead of EDT until September 12th. We'll look to have comments and positions by Sept 19 for final consolidation.

Definitions: all, as relevant

Introduction: Steve

A1: Steve with Ch3

A2: Steve with Allen

A3: Ben with Eric

A4: Eric and Farhan

A5: Eric and Farhan with Allen

Figure 1: Allen and Steve

B1: Ben

B2: Ben

B3: Ben

B4: Ben

B5: Ben, Eric, Farhan

B6: Eric and Farhan

Figure 2: Ben, Eric, Farhan

C1: Allen (with Farhan on C1.2)

C2: Allen and Eric

C3: Allen and Eric

Figure 3: Allen

Figure 4: Farhan

D1: Allen

D2: Farhan and Eric

D3: Farhan and Eric

D4: Eric and Allen

D5: Farhan and Eric

D6: Farhan and Eric

**Official**

**UNCLASSIFIED**

## Message

**From:** Eric Haxthausen [ehaxthausen@usaid.gov]  
**Sent:** 9/13/2018 6:04:33 PM  
**To:** Fawcett, Allen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c42c443c02834519bd99d9826afccf54-AFAWCETT]  
**Subject:** Re: IPCC 48 preparations - C2, C3, D4  
**Attachments:** EH General comments on SPM.docx; C2 (eh 091318 first pass).docx; C3 (eh first pass 091318).docx; D4 (eh 091218).docx; A5 (eh 091218) - still needs some work.docx

Allen,

good to catch up. For your reference, here are latest copies of my noodling on the sections we discussed. Yellow highlights generally mean that it merits looking into further. Green highlights in the comments section mean that I agree with the comment but haven't implemented a suggest text revision. We didn't really discuss the topline, but for some of the documents, I've started pulling them into the subsection page and revising them; you can see that in the updated version of A5.

I'll work on D4 some more, and will look for some time on Monday for another call.

best,  
 Eric

Eric Haxthausen  
 Senior Advisor  
 Global Climate Change Office  
 Bureau for Economic Growth, Education, and Environment  
 USAID

[ehaxthausen@usaid.gov](mailto:ehaxthausen@usaid.gov)  
 +1 (202) 216-3263 (office)  
 +1 (202) 550-3343 (mobile)

On Wed, Sep 12, 2018 at 5:00 PM Fawcett, Allen <[Fawcett.Allen@epa.gov](mailto:Fawcett.Allen@epa.gov)> wrote:

Sounds great Eric. Go ahead and give me a call tomorrow around then.

Allen

---

Allen A. Fawcett, Ph.D.

Chief, Climate Economics Branch

U.S. Environmental Protection Agency

Office: (202) 343-9436

Cell: (202) 412-5116

**From:** Eric Haxthausen [mailto:[ehaxthausen@usaid.gov](mailto:ehaxthausen@usaid.gov)]

**Sent:** Wednesday, September 12, 2018 4:50 PM

**To:** Fawcett, Allen <[Fawcett.Allen@epa.gov](mailto:Fawcett.Allen@epa.gov)>

**Subject:** Re: IPCC 48 preparations - C2, C3, D4

Hi Allen,

I could talk for a bit tomorrow at around 1:30 or a little before that. I haven't started looking at those sections yet, but will try to skim through them tomorrow. (I have been reviewing some of the items in A, B, and D, which arguably overlap with C.)

Shall I call you tomorrow around that time?

best,

Eric

Eric Haxthausen

Senior Advisor

Global Climate Change Office

Bureau for Economic Growth, Education, and Environment

USAID

[ehaxthausen@usaid.gov](mailto:ehaxthausen@usaid.gov)

+1 (202) 216-3263 (office)

+1 (202) 550-3343 (mobile)

On Wed, Sep 12, 2018 at 4:18 PM Fawcett, Allen <[Fawcett.Allen@epa.gov](mailto:Fawcett.Allen@epa.gov)> wrote:

Hi Eric,

I've started on C2 since that subsection is most relevant to our topline comments. I haven't done much on C3 yet, but it does have a fair number of more detailed comments. D4 looks pretty light on comments, not sure how much there is to do there. Would you have time for a call tomorrow to discuss? I'm free 11:30-2 if there's a time in there that works for you.

Allen

---

Allen A. Fawcett, Ph.D.

Chief, Climate Economics Branch

U.S. Environmental Protection Agency

Office: (202) 343-9436

Cell: (202) 412-5116

**From:** Eric Haxthausen [<mailto:ehaxthausen@usaid.gov>]

**Sent:** Tuesday, September 11, 2018 6:05 PM

**To:** Fawcett, Allen <[Fawcett.Allen@epa.gov](mailto:Fawcett.Allen@epa.gov)>

**Subject:** Re: IPCC 48 preparations - C2, C3, D4

Hi Allen,

Curious whether you have started on the above subsections (C2, C3, D4) on which Alice asked us to collaborate.

best,

Eric

Eric Haxthausen

Senior Advisor

Global Climate Change Office

Bureau for Economic Growth, Education, and Environment

USAID

[ehaxthausen@usaid.gov](mailto:ehaxthausen@usaid.gov)

+1 (202) 216-3263 (office)

+1 (202) 550-3343 (mobile)

On Fri, Aug 31, 2018 at 4:31 AM Alpert, Alice <[AlpertA@state.gov](mailto:AlpertA@state.gov)> wrote:

Hello expert team,

We are starting to prepare our arguments and preferred SPM text for the October meeting. I've outlined a process below for preparing our paper for the meeting, noting that another draft of the SPM will be released

## Deliberative Process / Ex. 5

I have prepared several documents to aid in this preparation:

## Deliberative Process / Ex. 5

# Deliberative Process / Ex. 5

What we are asking you to do is:

# Deliberative Process / Ex. 5

We plan to schedule a call to check in and answer questions later this week or next week. Trigg, Farhan, and I will be at a meeting in Bangkok, 11 hours ahead of EDT until September 12th. We'll look to have comments and positions by Sept 19 for final consolidation.

Definitions: all, as relevant

Introduction: Steve

A1: Steve with Ch3

A2: Steve with Allen

A3: Ben with Eric

A4: Eric and Farhan

A5: Eric and Farhan with Allen

Figure 1: Allen and Steve

B1: Ben

B2: Ben

B3: Ben

B4: Ben

B5: Ben, Eric, Farhan

B6: Eric and Farhan

Figure 2: Ben, Eric, Farhan

C1: Allen (with Farhan on C1.2)

C2: Allen and Eric

C3: Allen and Eric

Figure 3: Allen

Figure 4: Farhan

D1: Allen

D2: Farhan and Eric

D3: Farhan and Eric

D4: Eric and Allen

D5: Farhan and Eric

D6: Farhan and Eric

**Official**

**UNCLASSIFIED**

## Message

**From:** Alpert, Alice [AlpertA@state.gov]  
**Sent:** 10/11/2018 6:08:06 PM  
**To:** Talley, Trigg [TalleyT@state.gov]; Haxthausen, Eric M. (E3/GCC/PEL) [ehaxthausen@usaid.gov]; Fawcett, Allen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c42c443c02834519bd99d9826afccf54-AFAWCETT]  
**CC:** Akhtar, Farhan H [AkhtarFH@state.gov]; Gray, Stephen [sgray@usgs.gov]; Benjamin DeAngelo - NOAA Federal [ben.deangelo@noaa.gov]  
**Subject:** Re: SR1.5 draft summary  
**Attachments:** IPCC-XLVIII\_Doc. 5 - Approved Summary for Policymakers\_USA\_changesAB.pdf

Attached are my notes on what we got changed in sections A and B and figure 2. Changes are either comments that we made or advocated for at the meeting. Some changes were requested by other countries as well.

---

**From:** Talley, Trigg  
**Sent:** Thursday, October 11, 2018 1:40 PM  
**To:** Haxthausen, Eric M. (E3/GCC/PEL); Allen Fawcett (Fawcett.Allen@epa.gov)  
**Cc:** Akhtar, Farhan H; Alpert, Alice; Gray, Stephen; Benjamin DeAngelo - NOAA Federal  
**Subject:** RE: SR1.5 draft summary

Thanks, all.

**From:** Eric Haxthausen <ehaxthausen@usaid.gov>  
**Sent:** Thursday, October 11, 2018 1:26 PM  
**To:** Allen Fawcett (Fawcett.Allen@epa.gov) <Fawcett.Allen@epa.gov>  
**Cc:** Akhtar, Farhan H <AkhtarFH@state.gov>; Alpert, Alice <AlpertA@state.gov>; Gray, Stephen <sgray@usgs.gov>; Talley, Trigg <TalleyT@state.gov>; Benjamin DeAngelo - NOAA Federal <ben.deangelo@noaa.gov>  
**Subject:** Re: SR1.5 draft summary

Several more points, in addition to Steve's and Allen's excellent points. Thanks to Allen for circulating the very

**Deliberative Process / Ex. 5**

# Deliberative Process / Ex. 5

Eric Haxthausen  
Senior Advisor  
Global Climate Change Office  
Bureau for Economic Growth, Education, and Environment  
USAID

[ehaxthausen@usaid.gov](mailto:ehaxthausen@usaid.gov)

+1 (202) 216-3263 (office)

+1 (202) 550-3343 (mobile)

On Wed, Oct 10, 2018 at 2:27 PM Fawcett, Allen <[Fawcett.Allen@epa.gov](mailto:Fawcett.Allen@epa.gov)> wrote:

Hey Team,

Here are a few key changes we influenced through our comments and participation at the meeting last week. Let me know if you need anything else.

Thanks,  
Allen

# Deliberative Process / Ex. 5

Allen A. Fawcett, Ph.D.  
Chief, Climate Economics Branch  
U.S. Environmental Protection Agency  
Office: (202) 343-9436  
Cell: (202) 412-5116

**Official**  
**UNCLASSIFIED**

---

**From:** Akhtar, Farhan H [mailto:[AkhtarFH@state.gov](mailto:AkhtarFH@state.gov)]  
**Sent:** Wednesday, October 10, 2018 11:17 AM  
**To:** Haxthausen, Eric M. (E3/GCC/PEL) <[ehaxthausen@usaid.gov](mailto:ehaxthausen@usaid.gov)>; Alpert, Alice <[AlpertA@state.gov](mailto:AlpertA@state.gov)>  
**Cc:** Fawcett, Allen <[Fawcett.Allen@epa.gov](mailto:Fawcett.Allen@epa.gov)>; Stephen Gray <[sgray@usgs.gov](mailto:sgray@usgs.gov)>; Talley, Trigg <[TalleyT@state.gov](mailto:TalleyT@state.gov)>; Benjamin DeAngelo - NOAA Federal <[ben.deangelo@noaa.gov](mailto:ben.deangelo@noaa.gov)>  
**Subject:** RE: SR1.5 draft summary

Thanks everyone. We've used this information in a couple of memos so far. One final tasking: we need to go through and highlight where edits were made in response to our comments on the EGD and during the meeting last week.

# Deliberative Process / Ex. 5

Please send in notes by tomorrow afternoon, please.

Thanks again,  
Farhan

**From:** Eric Haxthausen <[ehaxthausen@usaid.gov](mailto:ehaxthausen@usaid.gov)>  
**Sent:** Tuesday, October 9, 2018 12:44 AM  
**To:** Alpert, Alice <[AlpertA@state.gov](mailto:AlpertA@state.gov)>  
**Cc:** Akhtar, Farhan H <[AkhtarFH@state.gov](mailto:AkhtarFH@state.gov)>; Fawcett, Allen <[Fawcett.Allen@epa.gov](mailto:Fawcett.Allen@epa.gov)>; Stephen Gray <[sgray@usgs.gov](mailto:sgray@usgs.gov)>; Talley, Trigg <[TalleyT@state.gov](mailto:TalleyT@state.gov)>; Benjamin DeAngelo - NOAA Federal <[ben.deangelo@noaa.gov](mailto:ben.deangelo@noaa.gov)>  
**Subject:** SR1.5 draft summary

## Deliberative Process / Ex. 5

Best,  
Eric

On Monday, October 8, 2018, Alpert, Alice <[AlpertA@state.gov](mailto:AlpertA@state.gov)> wrote:  
Thanks a lot for your feedback, Eric. I've revised the attached.

## Deliberative Process / Ex. 5

On Tue, Oct 9, 2018 at 7:49 AM Alpert, Alice <[AlpertA@state.gov](mailto:AlpertA@state.gov)> wrote:

**From:** Eric Haxthausen <[ehaxthausen@usaid.gov](mailto:ehaxthausen@usaid.gov)>  
**Sent:** Monday, October 8, 2018 9:51 PM  
**To:** Alpert, Alice  
**Cc:** Akhtar, Farhan H; Fawcett, Allen; Stephen Gray; Talley, Trigg  
**Subject:** SR1.5 draft summary

Hi Alice,  
Thanks for this. Some additional points to consider below, space depending. We would be interested in seeing the final memo and annex (redacted if necessary) to share with our leadership.

Best,  
Eric

Impacts:

## Deliberative Process / Ex. 5

# Deliberative Process / Ex. 5

On Sunday, October 7, 2018, Alpert, Alice <[AlpertA@state.gov](mailto:AlpertA@state.gov)> wrote:

Hello team,

Please review this draft 1pg summary of SR1.5 findings, with some questions and comments.

This is intended as a factual appendix to a memo describing the meeting and report context.

Alice

--

Eric Haxthausen  
Senior Advisor  
Global Climate Change Office  
Bureau for Economic Growth, Education, and Environment  
USAID

[ehaxthausen@usaid.gov](mailto:ehaxthausen@usaid.gov)

+1 (202) 216-3263 (office)

+1 (202) 550-3343 (mobile)

--

Eric Haxthausen  
Senior Advisor  
Global Climate Change Office  
Bureau for Economic Growth, Education, and Environment  
USAID

[ehaxthausen@usaid.gov](mailto:ehaxthausen@usaid.gov)

+1 (202) 216-3263 (office)

+1 (202) 550-3343 (mobile)

**Official**

**UNCLASSIFIED**

Appointment

---

**From:** Fawcett, Allen [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=C42C443C02834519BD99D9826AFCCF54-AFAWCETT]  
**Sent:** 10/26/2018 5:16:41 PM  
**To:** Dunham, Sarah [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A9444681441E4521AD92AE7D42919223-SDUNHAM]  
**Subject:** Accepted: Pre-brief on IPCC 1.5C Special Report  
**Location:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP  
**Start:** 11/15/2018 4:00:00 PM  
**End:** 11/15/2018 5:00:00 PM  
**Recurrence:** (none)

Appointment

---

**From:** Fawcett, Allen [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=C42C443C02834519BD99D9826AFCCF54-AFAWCETT]  
**Sent:** 10/26/2018 4:28:29 PM  
**To:** Dunham, Sarah [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A9444681441E4521AD92AE7D42919223-SDUNHAM]  
**Subject:** Accepted: Pre-brief on IPCC 1.5C Special Report  
**Location:** DCRoomWJCS5041FGOAPDirTB/DC-OAR-OAP  
**Start:** 11/5/2018 4:30:00 PM  
**End:** 11/5/2018 5:15:00 PM  
**Recurrence:** (none)

## Message

**From:** Konkus, John [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=555471B2BAA6419E8E141696F4577062-KONKUS, JOH]  
**Sent:** 10/8/2018 3:27:23 PM  
**To:** Gunasekara, Mandy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=53d1a3caa8bb4ebab8a2d28ca59b6f45-Gunasekara,]  
**Subject:** Re: IPCC climate change report

Updated statement:

# Deliberative Process / Ex. 5

John Konkus  
Environmental Protection Agency  
Deputy Associate Administrator  
Office of Public Affairs

On Oct 8, 2018, at 10:55 AM, Gunasekara, Mandy <[Gunasekara.Mandy@epa.gov](mailto:Gunasekara.Mandy@epa.gov)> wrote:

## Deliberative Process / Ex. 5

Sent from my iPhone

On Oct 8, 2018, at 9:23 AM, Konkus, John <[konkus.john@epa.gov](mailto:konkus.john@epa.gov)> wrote:

Is this a good statement?

Sent from my iPhone

On Oct 7, 2018, at 10:45 PM, Konkus, John <[konkus.john@epa.gov](mailto:konkus.john@epa.gov)> wrote:

## Deliberative Process / Ex. 5

Sent from my iPhone

Begin forwarded message:

**Resent-From:** <[Press@epa.gov](mailto:Press@epa.gov)>  
**From:** Timothy Cama <[tcama@thehill.com](mailto:tcama@thehill.com)>

**Date:** October 7, 2018 at 10:15:54 PM EDT  
**To:** Press <[Press@epa.gov](mailto:Press@epa.gov)>  
**Subject:** IPCC climate change report

Hi folks-

Did you want to respond to the IPCC report on 1.5 degrees of global warming that just came out? Link here: <http://www.ipcc.ch/report/sr15/>

Thanks.

--

Timothy Cama, Staff writer  
The Hill  
(202) 695-6245  
Secure: [timothy.cama@protonmail.com](mailto:timothy.cama@protonmail.com)

Message

---

**From:** Konkus, John [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=555471B2BAA6419E8E141696F4577062-KONKUS, JOH]  
**Sent:** 10/8/2018 3:06:54 PM  
**To:** Gunasekara, Mandy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=53d1a3caa8bb4ebab8a2d28ca59b6f45-Gunasekara,]  
**Subject:** Re: IPCC climate change report

OK I can add that to the next round of inquiries I've gotten these out the door.

IPCC Inquiries thru 10:30am today:

The Guardian

S&P Global

BBC

ABC

The Hill

John Konkus  
Environmental Protection Agency  
Deputy Associate Administrator  
Office of Public Affairs

On Oct 8, 2018, at 10:55 AM, Gunasekara, Mandy <[Gunasekara.Mandy@epa.gov](mailto:Gunasekara.Mandy@epa.gov)> wrote:

**Deliberative Process / Ex. 5**

Sent from my iPhone

On Oct 8, 2018, at 9:23 AM, Konkus, John <[konkus.john@epa.gov](mailto:konkus.john@epa.gov)> wrote:

Is this a good statement?

Sent from my iPhone

On Oct 7, 2018, at 10:45 PM, Konkus, John <[konkus.john@epa.gov](mailto:konkus.john@epa.gov)> wrote:

**Deliberative Process / Ex. 5**

# Deliberative Process / Ex. 5

Sent from my iPhone

Begin forwarded message:

**Resent-From:** <[Press@epa.gov](mailto:Press@epa.gov)>  
**From:** Timothy Cama <[tcama@thehill.com](mailto:tcama@thehill.com)>  
**Date:** October 7, 2018 at 10:15:54 PM EDT  
**To:** Press <[Press@epa.gov](mailto:Press@epa.gov)>  
**Subject:** IPCC climate change report

Hi folks-

Did you want to respond to the IPCC report on 1.5 degrees of global warming that just came out? Link here: <http://www.ipcc.ch/report/sr15/>

Thanks.

--

Timothy Cama, Staff writer  
The Hill  
(202) 695-6245  
Secure: [timothy.cama@protonmail.com](mailto:timothy.cama@protonmail.com)

Message

---

**From:** Konkus, John [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=555471B2BAA6419E8E141696F4577062-KONKUS, JOH]  
**Sent:** 10/8/2018 1:37:14 PM  
**To:** Gunasekara, Mandy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=53d1a3caa8bb4ebab8a2d28ca59b6f45-Gunasekara,]  
**Subject:** Fwd: Statement re: IPCC climate change report

Third inquiry

Sent from my iPhone

Begin forwarded message:

**Resent-From:** <[Press@epa.gov](mailto:Press@epa.gov)>  
**From:** "Hale, Zack" <[zack.hale@spglobal.com](mailto:zack.hale@spglobal.com)>  
**Date:** October 8, 2018 at 9:23:21 AM EDT  
**To:** Press <[Press@epa.gov](mailto:Press@epa.gov)>  
**Subject:** Statement re: IPCC climate change report

Hello,

I was just wondering if EPA has a response to the U.N. Intergovernmental Panel on Climate Change's report released yesterday. If so, it would be great to include in a story for later this afternoon.

Thanks for your help.

**Zack Hale**  
Reporter, EPA & Electric Utilities

**S&P Global Market Intelligence**  
1700 North Moore Street, Suite 1110  
Arlington, VA 22209  
O: 703.373.0167  
M: 206.939.1119  
[zack.hale@spglobal.com](mailto:zack.hale@spglobal.com)  
Twitter: @zackhale  
[www.spglobal.com](http://www.spglobal.com)



---

The information contained in this message is intended only for the recipient, and may be a confidential attorney-client communication or may otherwise be privileged and confidential and protected from disclosure. If the reader of this message is not the intended recipient, or an employee or agent responsible for delivering this message to the intended recipient, please be aware that any dissemination or copying of this communication is strictly prohibited. If you have received this communication in error, please immediately notify us by replying to the message and deleting it from your computer. S&P Global Inc. reserves the right, subject to applicable local law, to monitor, review and process the content of any electronic message or information sent to or from S&P Global Inc. e-mail addresses without informing the sender or recipient of the message. By sending electronic message or information to S&P Global Inc. e-mail addresses you, as the sender, are consenting to S&P Global Inc. processing any of your personal data therein.

The content image001.jpg of type has been blocked.

Message

---

**From:** Konkus, John [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=555471B2BAA6419E8E141696F4577062-KONKUS, JOH]  
**Sent:** 10/8/2018 2:59:14 AM  
**To:** Gunasekara, Mandy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=53d1a3caa8bb4ebab8a2d28ca59b6f45-Gunasekara,]  
**Subject:** Fwd: Comment on IPCC report

Second inquiry...

Sent from my iPhone

Begin forwarded message:

**From:** "Ebbs, Stephanie" <[Stephanie.Ebbs@abc.com](mailto:Stephanie.Ebbs@abc.com)>  
**Date:** October 7, 2018 at 10:56:53 PM EDT  
**To:** "John Konkus" <[konkus.john@epa.gov](mailto:konkus.john@epa.gov)>, EPA Mike Abboud <[abboud.michael@epa.gov](mailto:abboud.michael@epa.gov)>, "Hewitt, James" <[hewitt.james@epa.gov](mailto:hewitt.james@epa.gov)>  
**Subject:** Comment on IPCC report

Evening guys,

I just wanted to put this on your radar for a story I'll be working on tomorrow. Will EPA make anyone available to speak to the new IPCC report and whether it will have any impact on the pending policies that impact greenhouse gas emissions?

Thank you l

Stephanie Ebbs  
ABC News- Washington  
202-875-4377

Message

---

**From:** Szabo, Aaron L. EOP/CEQ **EOP / Ex. 6**  
**Sent:** 10/5/2018 6:33:48 PM  
**To:** Gunasekara, Mandy [/o=ExchangeLabs/ou=Exchange Administrative Group  
(FYDIBOHF23SPDLT)/cn=Recipients/cn=53d1a3caa8bb4ebab8a2d28ca59b6f45-Gunasekara,]  
**Subject:** Talking Points  
**Attachments:** 20181003 Press guidance IPCC Special Report.docx

**Aaron L. Szabo**  
Senior Counsel  
Council on Environmental Quality

**EOP / Ex. 6**

## Message

**From:** Lewis, Josh [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=B22D1D3BB3F84436A524F76AB6C79D7E-JOLEWIS]  
**Sent:** 10/19/2018 7:20:17 PM  
**To:** Wehrum, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=33d96ae800cf43a3911d94a7130b6c41-Wehrum, Wil]; Gunasekara, Mandy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=53d1a3caa8bb4ebab8a2d28ca59b6f45-Gunasekara,]; Woods, Clint [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bc65010f5c2e48f4bc2aa050db50d198-Woods, Clin]  
**CC:** Dominguez, Alexander [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=5ced433b4ef54171864ed98a36cb7a5f-Dominguez,]  
**Subject:** Acting Administrator meeting on Monday with Andrew Wheeler  
**Attachments:** UCS\_ October 19 2018.docx; Statement of the United States of America on the IPCC Special Report on Global Warming of 1.pdf

Attached is what I just sent down as background for Monday's meeting. You'll see it's focused on the topics that will

# Deliberative Process / Ex. 5

Josh

---

**From:** Lewis, Josh  
**Sent:** Friday, October 19, 2018 3:13 PM  
**To:** Eby, Natasha <eby.natasha@epa.gov>  
**Cc:** Dominguez, Alexander <dominguez.alexander@epa.gov>  
**Subject:** RE: Briefing materials for binder needed by 3:30 today

Here's background info for the UCS meeting.

---

**From:** Eby, Natasha  
**Sent:** Friday, October 19, 2018 1:06 PM  
**To:** Dominguez, Alexander <dominguez.alexander@epa.gov>; Lewis, Josh <Lewis.Josh@epa.gov>; Gunasekara, Mandy <Gunasekara.Mandy@epa.gov>  
**Subject:** Briefing materials for binder needed by 3:30 today

Hi Mandy, Josh and Alex!

The Administrator has just informed me he is leaving early today. Do you think you can provide me with his briefing materials (American Wind Energy Association and Union of Concerned Scientists) by 3:30 today please?

Thank you so much!

Natasha

**Natasha Y. Eby**

*Special Assistant to the Administrator*

Office of the Administrator

U.S. Environmental Protection Agency

1200 Pennsylvania Ave., N.W.

Washington, D.C. 20460

## Message

**From:** Gunasekara, Mandy [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=53D1A3CAA8BB4EBAB8A2D28CA59B6F45-GUNASEKARA,]  
**Sent:** 10/5/2018 6:53:18 PM  
**To:** Konkus, John [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=555471b2baa6419e8e141696f4577062-Konkus, Joh]; Abboud, Michael [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b6f5af791a1842f1adcc088cbf9ed3ce-Abboud, Mic]; Block, Molly [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=60d0c681a16441a0b4fa16aa2dd4b9c5-Block, Moll]; Hewitt, James [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=41b19dd598d340bb8032923d902d4bd1-Hewitt, Jam]; Beach, Christopher [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=6b124299bb6f46a39aa5d84519f25d5d-Beach, Chri]  
**CC:** Jackson, Ryan [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=38bc8e18791a47d88a279db2fec8bd60-Jackson, Ry]; Dominguez, Alexander [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=5ced433b4ef54171864ed98a36cb7a5f-Dominguez,]  
**Subject:** 20181003 Press guidance IPCC Special Report.docx  
**Attachments:** 20181003 Press guidance IPCC Special Report.docx; ATT00001.txt

FYI things for next week:

Attached are some TPs/press guidance for the upcoming release of the 1.5 degree C special report from IPCC (I received from the WH). Expected release of the report is Sunday evening. I imagine we will get questions.

# Deliberative Process / Ex. 5

Message

---

**From:** Gunasekara, Mandy [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=53D1A3CAA8BB4EBAB8A2D28CA59B6F45-GUNASEKARA,]  
**Sent:** 10/5/2018 6:38:54 PM  
**To:** Szabo, Aaron L. EOP/CEQ [Aaron.L.Szabo@ceq.eop.gov]  
**Subject:** Re: Talking Points

Thank you!

Sent from my iPhone

On Oct 5, 2018, at 2:33 PM, Szabo, Aaron L. EOP/CEQ <EOP / Ex. 6> wrote:

**Aaron L. Szabo**  
Senior Counsel  
Council on Environmental Quality

**EOP / Ex. 6**

<20181003 Press guidance IPCC Special Report.docx>

Appointment

---

**From:** Gunasekara, Mandy [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=53D1A3CAA8BB4EBAB8A2D28CA59B6F45-GUNASEKARA,]  
**Sent:** 10/29/2018 3:53:49 PM  
**To:** Wehrum, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=33d96ae800cf43a3911d94a7130b6c41-Wehrum, Wil]  
**Subject:** Accepted: IPCC 1.5C Special Report  
**Location:** WJC - N 5400  
  
**Start:** 11/26/2018 6:00:00 PM  
**End:** 11/26/2018 7:00:00 PM  
  
**Recurrence:** (none)

Message

---

**From:** Desai, Mausami [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=AE67EB8217FB487CB5EEFFC12C8C427E-MDESAI]  
**Sent:** 10/24/2018 10:17:11 PM  
**To:** Gunning, Paul [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=f65040017f05429aa05572f096a50463-PGUNNING]  
**CC:** Krieger, Jackie [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9b5c0c79be3c4821baf10ab9cf823e82-JKrieger]; Irving, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=7056450189224b4daf3e399831fb0f8b-BIRVIN02]  
**Subject:** FYI - Request from OITA for COP24 Background for their Administrator  
**Attachments:** COP24 EPA overview 10-24-8 final to OAR\_updated.docx

Hi Paul -

Just flagging I received a request from OITA (Brianna Besch) to provide a background for their AA McIntosh, he has a meeting with the Administrator tomorrow. I didn't get any details on the agenda. Brianna had tried calling Henry, Bill, etc. and then followed up with me (after 5 pm). I am just checking with State if there are any updates other than those reflected here (i.e. removed that HoD is Judy Garber as it is still TBD).

Since our previous overview has not changed much, was going to forward that, see attached. Will review again quickly for any typos and send back and cc: Jackie and Henry?

Can also make this shorter since the request was not very specific?

Thanks,  
Mausami

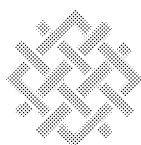
---

(Ms.) Mausami Desai  
U.S. EPA, Office of Atmospheric Programs  
(202) 343-9381  
[desai.mausami@epa.gov](mailto:desai.mausami@epa.gov)

## Message

**From:** World Resources Institute [climateprogram@wri.org]  
**Sent:** 11/15/2018 7:05:36 PM  
**To:** Gunning, Paul [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=f65040017f05429aa05572f096a50463-PGUNNING]  
**Subject:** A New Sustainable Ocean Economy | A Virtual Climate Summit - Nov. 22

[View Online](#)



WORLD  
RESOURCES  
INSTITUTE

*World Resources Institute and Friends of Ocean Action*

*Invite You to*

**A New Sustainable Ocean Economy**  
***Advancing Climate and Ocean Action***  
**Thursday, November 22, 2018**

**11:45 am – 12:45am GMT | 11:45 pm – 12:45am Majuro**



In just under a week, the **Climate Vulnerable Forum** will hold the world's first virtual summit on Thursday, November 22. Chaired by the President of the Republic of the Marshall Islands, Dr Hilda Heine, the **2018 CVF Virtual Climate Summit** will convene world leaders to focus on ways to safeguard the world's most vulnerable groups from climate change and respond to the urgency expressed in the recent IPCC Special Report on 1.5C.

Join experts from government, research institutions and the UN to identify

the next frontier of ocean and climate action – exploring opportunities to protect, produce and prosper from the ocean in the face of a changing climate.

## FEATURING

---

### **Peter Thomson**

*UN Secretary General's Special Envoy for the Ocean and Co-Chair of the Friends of Ocean Action*

### **Olai Uludong**

*Permanent Representative from Palau to the United Nations, Palau's Ambassador on Climate Change and Sherpa for the President of the Republic of Palau & Co-Chair of the High Level Panel for a Sustainable Ocean Economy*

### **Julio Cordano**

*Ministry of Foreign Affairs, Government of Chile*

### **Vidar Helgesen**

*Norway's Special Envoy for the Ocean and Sherpa for the Prime Minister of Norway & Co-Chair of the High Level Panel for a Sustainable Ocean Economy*

### **Maria Damanaki**

*Global Managing Director for Oceans, The Nature Conservancy*

## MODERATED BY

---

### **Kristian Teleki**

*Director - Sustainable Ocean Initiative, World Resources Institute, Head of*

*Secretariat to the High Level Panel for a Sustainable Ocean Economy and  
Head of the Friends of Ocean Action*

---

For more information visit:

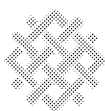
**[www.wri.org/events/2018/11/cvf-virtual-climate-summit-panel-new-sustainable-ocean-economy](http://www.wri.org/events/2018/11/cvf-virtual-climate-summit-panel-new-sustainable-ocean-economy)**

To add this event to your calendar click below:



---

Connect with us:     



**WORLD  
RESOURCES  
INSTITUTE**

10 G Street NE Suite 800  
Washington, DC 20002, USA  
[www.wri.org](http://www.wri.org)

**PHONE** +1 (202) 729-7600

**FAX** +1 (202) 729-7610

**DONATE**

---

[Email Preferences](#) • [Privacy Policy](#)



## Appointment

**From:** Rakosnik, Delaney [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=274573739a9f446883072599086ededd-Rakosnik, D]  
**Sent:** 10/26/2018 3:31:00 PM  
**To:** Wehrum, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=33d96ae800cf43a3911d94a7130b6c41-Wehrum, Wil]; Gunasekara, Mandy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=53d1a3caa8bb4ebab8a2d28ca59b6f45-Gunasekara,]; Dunham, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9444681441e4521ad92ae7d42919223-SDUNHAM]; Krieger, Jackie [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9b5c0c79be3c4821baf10ab9cf823e82-JKrieger]; Gunning, Paul [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=f65040017f05429aa05572f096a50463-PGUNNING]; Kocchi, Suzanne [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bd05a97675954ea084bf5eed8b54ee2f-SKOCCHI]; Fawcett, Allen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c42c443c02834519bd99d9826afccf54-AFAWCETT]; Birnbaum, Rona [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3e09449084a84b05bc34f43b76ca8dbc-RBIRNBAU]; Irving, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=7056450189224b4daf3e399831fb0f8b-BIRVIN02]; Ferland, Henry [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9d90b80365d4bdda9b9b0ec302c963f-HFERLAND]  
**CC:** Martinich, Jeremy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=4042067053eb4feab35127a0b65e517b-JMartini]; Crimmins, Allison [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=661122a77e5a4ea1b9517ab53fc3ce1b-Crimmins, Allison]  
**Subject:** IPCC 1.5C Special Report  
**Attachments:** Meeting Request for Bill Wehrum  
**Location:** WJC - N 5400  
**Start:** 11/26/2018 6:00:00 PM  
**End:** 11/26/2018 7:00:00 PM  
**Show Time As:** Busy

**TO:** Bill Wehrum, Mandy Gunasekara, Sara Dunham, Jackie Krieger, Paul Gunning, Suzanne Kocchi, Allen Fawcett, Rona Birnbaum, William Irving



Meeting Request  
for Bill Wehrum

Appointment

---

**From:** Irving, Bill [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=7056450189224B4DAF3E399831FB0F8B-BIRVIN02]  
**Sent:** 10/26/2018 4:23:26 PM  
**To:** Wehrum, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=33d96ae800cf43a3911d94a7130b6c41-Wehrum, Wil]  
**Subject:** Tentative: IPCC 1.5C Special Report  
**Location:** WJC - N 5400  
  
**Start:** 11/8/2018 7:00:00 PM  
**End:** 11/8/2018 8:00:00 PM  
  
**Recurrence:** (none)

Appointment

---

**From:** Murphy, Tina [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=03E381B938CD4B279E8DA793984C33F1-MURPHY, TINA]  
**Sent:** 10/26/2018 3:52:20 PM  
**To:** Wehrum, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=33d96ae800cf43a3911d94a7130b6c41-Wehrum, Wil]  
**Subject:** Accepted: IPCC 1.5C Special Report  
**Location:** WJC - N 5400  
  
**Start:** 11/8/2018 7:00:00 PM  
**End:** 11/8/2018 8:00:00 PM  
**Show Time As:** Busy

Appointment

---

**From:** Irving, Bill [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=7056450189224B4DAF3E399831FB0F8B-BIRVIN02]  
**Sent:** 10/26/2018 3:33:51 PM  
**To:** Wehrum, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=33d96ae800cf43a3911d94a7130b6c41-Wehrum, Wil]  
**Subject:** Tentative: IPCC 1.5C Special Report  
**Location:** WJC - N 5400  
  
**Start:** 11/7/2018 7:00:00 PM  
**End:** 11/7/2018 8:00:00 PM  
  
**Recurrence:** (none)

Message

---

**From:** Gunning, Paul [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=F65040017F05429AA05572F096A50463-PGUNNING]  
**Sent:** 10/12/2018 6:41:54 PM  
**To:** Wehrum, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=33d96ae800cf43a3911d94a7130b6c41-Wehrum, Wil]  
**CC:** Dunham, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9444681441e4521ad92ae7d42919223-SDUNHAM]; Krieger, Jackie [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9b5c0c79be3c4821baf10ab9cf823e82-JKrieger]; Lewis, Josh [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b22d1d3bb3f84436a524f76ab6c79d7e-JOLEWIS]  
**Subject:** IPCC Report on 1.5 degrees  
**Attachments:** sr15\_spm\_final.pdf; Statement of the United States of America on the IPCC Special Report on Global Warming of 1.pdf

Bill – I hope all is well. Sarah mentioned that you wanted to get a copy of the IPCC special report on 1.5 degrees . I have attached the pdf version of the final Summary for Policy Makers as well as a link to the IPCCC web site that contains the full contents of the report (broken out by chapter). I have also attached the official USG statement that was delivered by State Department at the IPCC meeting following the approval of the final report.

Please let me know if you have any questions or need any additional information.

Have a great weekend.

Paul

Full Report can be found at:

<http://www.ipcc.ch/report/sr15/>



INTERGOVERNMENTAL PANEL ON climate change

# GLOBAL WARMING OF 1.5 °C

an IPCC special report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty

## *Summary for Policymakers*

This Summary for Policymakers was formally approved at the First Joint Session of Working Groups I, II and III of the IPCC and accepted by the 48<sup>th</sup> Session of the IPCC, Incheon, Republic of Korea, 6 October 2018.

SUBJECT TO COPY EDIT



## Summary for Policymakers

**Drafting Authors:** Myles Allen (UK), Mustafa Babiker (Sudan), Yang Chen (China), Heleen de Coninck (Netherlands), Sarah Connors (UK), Renée van Diemen (Netherlands), Opha Pauline Dube (Botswana), Kris Ebi (USA), Francois Engelbrecht (South Africa), Marion Ferrat (UK/France), James Ford (UK), Piers Forster (UK), Sabine Fuss (Germany), Tania Guillen (Germany/Nicaragua), Jordan Harold (UK), Ove Hoegh-Guldberg (Australia), Jean-Charles Hourcade (France), Daniel Huppmann (Austria), Daniela Jacob (Germany), Kejun Jiang (China), Tom Gabriel Johansen (Norway), Mikiko Kainuma (Japan), Kiane de Kleijne (Netherlands), Elmar Kriegler (Germany), Debora Ley (Guatemala/Mexico), Diana Liverman (USA), Natalie Mahowald (USA), Valérie Masson-Delmotte (France), Robin Matthews (UK), Reinhard Melcher (Austria), Richard Millar (UK), Katja Mintenbeck (Germany), Angela Morelli (Norway/Italy), Wilfran Moufouma-Okia (France/Congo), Luis Mundaca (Sweden/Chile), Maïke Nicolai (Germany), Chukwumerije Okereke (UK/Nigeria), Minal Pathak (India), Anthony Payne (UK), Roz Pidcock (UK), Anna Pirani (Italy), Elvira Poloczanska (UK/Australia), Hans-Otto Pörtner (Germany), Aromar Revi (India), Keywan Riahi (Austria), Debra C. Roberts (South Africa), Joeri Rogelj (Austria/Belgium), Joyashree Roy (India), Sonia Seneviratne (Switzerland), Priyadarshi R. Shukla (India), James Skea (UK), Raphael Slade (UK), Drew Shindell (USA), Chandni Singh (India), William Solecki (USA), Linda Steg (Netherlands), Michael Taylor (Jamaica), Petra Tschakert (Australia/Austria), Henri Waisman (France), Rachel Warren (UK), Panmao Zhai (China), Kirsten Zickfeld (Canada)

## Acknowledgements

We are very grateful for the expertise, rigour and dedication shown throughout by the volunteer Coordinating Lead Authors and Lead Authors, with important help by the many Contributing Authors. Working across scientific disciplines in each chapter of the Special Report on Global Warming of 1.5°C. The Review Editors have played a critical role in assisting the author teams and ensuring the integrity of the review process. We express our sincere appreciation to all the expert and government reviewers. A special thanks goes to the Chapter Scientists of this report who went above and beyond what was expected of them: Neville Ellis, Tania Guillén Bolaños, Daniel Huppmann, Kiane de Kleijne, Richard Millar and Chandni Singh.

We would also like to thank the three IPCC Vice-Chairs Ko Barrett, Thelma Krug, and Youba Sokona as well as the members of the WGI, WGII and WGIII Bureaus for their assistance, guidance, and wisdom throughout the preparation of the report: Amjad Abdulla, Edwin Aldrian, Carlo Carraro, Diriba Korecha Dadi, Fatima Driouech, Andreas Fischlin, Gregory Flato, Jan Fuglestad, Mark Howden, Nagmeldin G. E. Mahmoud, Carlos Mendez, Joy Jacqueline Pereira, Ramón Pichs-Madruga, Andy Reisinger, Roberto Sánchez Rodríguez, Sergey Semenov, Muhammad I. Tariq, Diana Ürge-Vorsatz, Carolina Vera, Pius Yanda, Nouredine Yassaa, and Taha Zatari.

Our heartfelt thanks go to the hosts and organizers of the scoping meeting and the four Special Report on 1.5°C Lead Author Meetings. We gratefully acknowledge the support from the host countries and institutions: World Meteorological Organisation, Switzerland; Ministry of Foreign

Affairs, and the National Institute for Space Research (INPE), Brazil; Met Office and the University of Exeter, The United Kingdom; Swedish Meteorological and Hydrological Institute (SMHI), Sweden; the Ministry of Environment Natural Resources Conservation and Tourism, the National Climate Change Committee in the Department of Meteorological Services and the Botswana Global Environmental Change Committee at the University of Botswana, Botswana; and the government of the Republic of Korea. The support provided by governments and institutions, as well as through contributions to the IPCC Trust Fund, is thankfully acknowledged as it enabled the participation of the author teams in the preparation of the report. The efficient operation of the Working Group I Technical Support Unit was made possible by the generous financial support provided by the government of France and administrative and information technology support from the University Paris Saclay (France), Institut Pierre Simon Laplace (IPSL) and the Laboratoire des Sciences du Climat et de l'Environnement (LSCE). We thank the Norwegian Environment Agency for supporting the preparation of the graphics for the Summary for Policymakers.

We would also like to thank Abdalah Mokssit, Secretary of the IPCC, and the staff of the IPCC Secretariat: Kerstin Stendahl, Jonathan Lynn, Sophie Schlingemann, Judith Ewa, Mxolisi Shongwe, Jesbin Baidya, Werani Zabula, Nina Peeva, Joelle Fernandez, Annie Courtin, Laura Biagioni and Oksana Ekzarho. Thanks are due to Elhousseine Gouaini who served as the conference officer for the 48th Session of the IPCC.

Finally, our particular appreciation goes to the Working Group Technical Support Units whose tireless dedication, professionalism and enthusiasm led the production of this special report. This report could not have been prepared without the commitment of members of the Working Group I Technical Support Unit, all new to the IPCC, who rose to the unprecedented AR6 challenge, and were pivotal in all aspects of the preparation of the report: Yang Chen, Sarah Connors, Melissa Gomez, Elisabeth Lonnoy, Robin Matthews, Wilfran-Moufouma-Okia, Clotilde Péan, Roz Pidcock, Anna Pirani, Nicholas Reay, Tim Waterfield, and Xiao Zhou. Our warmest thanks go to the collegial and collaborative support provided by Marlies Craig, Andrew Okem, Jan Petzold, Melinda Tignor and Nora Weyer from the WGII Technical Support Unit and Bhushan Kankal, Suvadip Neogi, Joana Portugal Pereira from the WGIII Technical Support Unit. A special thanks goes to Kenny Coventry, Harmen Gudde, Irene Lorenzoni, and Steve Jenkins for their support with the figures in the Summary for Policymakers, as well as Nigel Hawtin for graphical support of the report. In addition, the following contributions are gratefully acknowledged: Tom Maycock (operational support and copy edit), Jatinder Padda (copy edit), Melissa Dawes (copy edit), Marilyn Anderson (index), Vincent Grégoire (layout) and Sarah le Rouzic (intern).

**Date of Summary for Policymakers: 6 October 2018**

Introduction

This report responds to the invitation for IPCC ‘... to provide a Special Report in 2018 on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways’ contained in the Decision of the 21st Conference of Parties of the United Nations Framework Convention on Climate Change to adopt the Paris Agreement.<sup>1</sup>

The IPCC accepted the invitation in April 2016, deciding to prepare this Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.

This Summary for Policy Makers (SPM) presents the key findings of the Special Report, based on the assessment of the available scientific, technical and socio-economic literature<sup>2</sup> relevant to global warming of 1.5°C and for the comparison between global warming of 1.5°C and 2°C above pre-industrial levels. The level of confidence associated with each key finding is reported using the IPCC calibrated language.<sup>3</sup> The underlying scientific basis of each key finding is indicated by references provided to chapter elements. In the SPM, knowledge gaps are identified associated with the underlying chapters of the report.

<sup>1</sup> Decision 1/CP.21, paragraph 21.

<sup>2</sup> The assessment covers literature accepted for publication by 15 May 2018.

<sup>3</sup> Each finding is grounded in an evaluation of underlying evidence and agreement. A level of confidence is expressed using five qualifiers: very low, low, medium, high and very high, and typeset in italics, for example, *medium confidence*. The following terms have been used to indicate the assessed likelihood of an outcome or a result: virtually certain 99–100% probability, very likely 90–100%, likely 66–100%, about as likely as not 33–66%, unlikely 0–33%, very unlikely 0–10%, exceptionally unlikely 0–1%. Additional terms (extremely likely 95–100%, more likely than not >50–100%, more unlikely than likely 0–<50%, extremely unlikely 0–5%) may also be used when appropriate. Assessed likelihood is typeset in italics, for example, *very likely*. This is consistent with AR5.

## A. Understanding Global Warming of 1.5°C<sup>4</sup>

**A1. Human activities are estimated to have caused approximately 1.0°C of global warming<sup>5</sup> above pre-industrial levels, with a *likely* range of 0.8°C to 1.2°C. Global warming is *likely* to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate. (*high confidence*) {1.2, Figure SPM.1}**

**A1.1.** Reflecting the long-term warming trend since pre-industrial times, observed global mean surface temperature (GMST) for the decade 2006–2015 was 0.87°C (*likely* between 0.75°C and 0.99°C)<sup>6</sup> higher than the average over the 1850–1900 period (*very high confidence*). Estimated anthropogenic global warming matches the level of observed warming to within ±20% (*likely* range). Estimated anthropogenic global warming is currently increasing at 0.2°C (*likely* between 0.1°C and 0.3°C) per decade due to past and ongoing emissions (*high confidence*). {1.2.1, Table 1.1, 1.2.4}

**A1.2.** Warming greater than the global annual average is being experienced in many land regions and seasons, including two to three times higher in the Arctic. Warming is generally higher over land than over the ocean. (*high confidence*) {1.2.1, 1.2.2, Figure 1.1, Figure 1.3, 3.3.1, 3.3.2}

**A1.3.** Trends in intensity and frequency of some climate and weather extremes have been detected over time spans during which about 0.5°C of global warming occurred (*medium confidence*). This assessment is based on several lines of evidence, including attribution studies for changes in extremes since 1950. {3.3.1, 3.3.2, 3.3.3}

**A.2. Warming from anthropogenic emissions from the pre-industrial period to the present will persist for centuries to millennia and will continue to cause further long-term changes in the climate system, such as sea level rise, with associated impacts (*high confidence*), but these emissions alone are *unlikely* to cause global warming of 1.5°C (*medium confidence*) {1.2, 3.3, Figure 1.5, Figure SPM.1}**

**A2.1.** Anthropogenic emissions (including greenhouse gases, aerosols and their precursors) up to the present are *unlikely* to cause further warming of more than 0.5°C over the next two to three decades (*high confidence*) or on a century time scale (*medium confidence*). {1.2.4, Figure 1.5}

---

<sup>4</sup> SPM BOX.1: Core Concepts

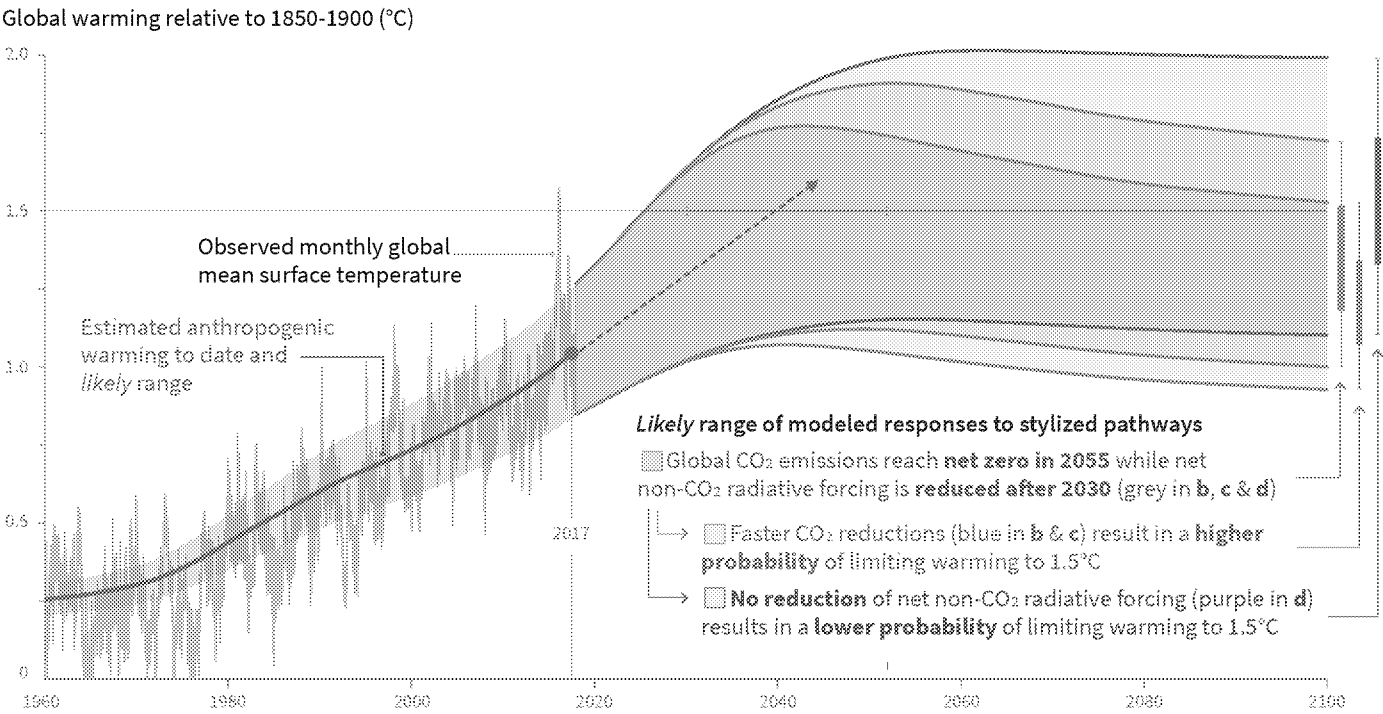
<sup>5</sup> Present level of global warming is defined as the average of a 30-year period centered on 2017 assuming the recent rate of warming continues.

<sup>6</sup> This range spans the four available peer-reviewed estimates of the observed GMST change and also accounts for additional uncertainty due to possible short-term natural variability. {1.2.1, Table 1.1}

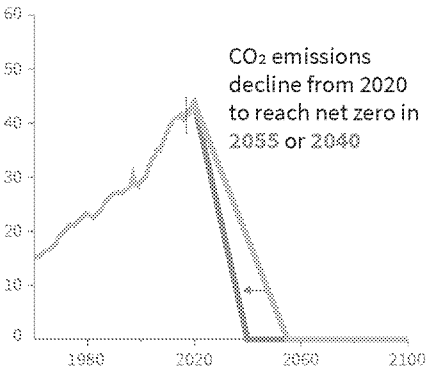
**A2.2.** Reaching and sustaining net-zero global anthropogenic CO<sub>2</sub> emissions and declining net non-CO<sub>2</sub> radiative forcing would halt anthropogenic global warming on multi-decadal timescales (*high confidence*). The maximum temperature reached is then determined by cumulative net global anthropogenic CO<sub>2</sub> emissions up to the time of net zero CO<sub>2</sub> emissions (*high confidence*) and the level of non-CO<sub>2</sub> radiative forcing in the decades prior to the time that maximum temperatures are reached (*medium confidence*). On longer timescales, sustained net negative global anthropogenic CO<sub>2</sub> emissions and/or further reductions in non-CO<sub>2</sub> radiative forcing may still be required to prevent further warming due to Earth system feedbacks and reverse ocean acidification (*medium confidence*) and will be required to minimise sea level rise (*high confidence*). {Cross-Chapter Box 2 in Chapter 1, 1.2.3, 1.2.4, Figure 1.4, 2.2.1, 2.2.2, 3.4.4.8, 3.4.5.1, 3.6.3.2}

Cumulative emissions of CO<sub>2</sub> and future non-CO<sub>2</sub> radiative forcing determine the probability of limiting warming to 1.5°C

a) Observed global temperature change and modeled responses to stylized anthropogenic emission and forcing pathways

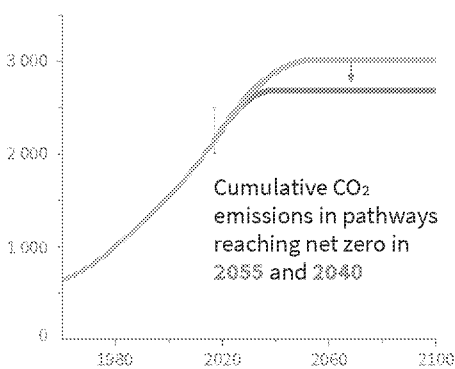


b) Stylized net global CO<sub>2</sub> emission pathways  
Billion tonnes CO<sub>2</sub> per year (GtCO<sub>2</sub>/yr)



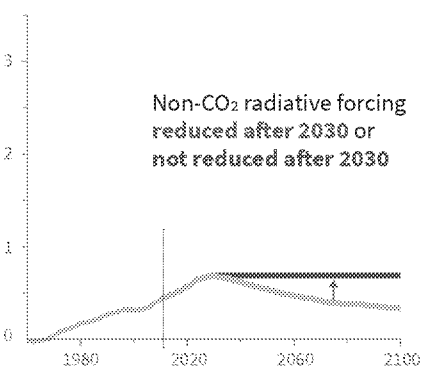
Faster immediate CO<sub>2</sub> emission reductions limit cumulative CO<sub>2</sub> emissions shown in panel (c).

c) Cumulative net CO<sub>2</sub> emissions  
Billion tonnes CO<sub>2</sub> (GtCO<sub>2</sub>)



Maximum temperature rise is determined by cumulative net CO<sub>2</sub> emissions and net non-CO<sub>2</sub> radiative forcing due to methane, nitrous oxide, aerosols and other anthropogenic forcing agents.

d) Non-CO<sub>2</sub> radiative forcing pathways  
Watts per square metre (W/m<sup>2</sup>)



**Figure SPM.1:** Panel a: Observed monthly global mean surface temperature (GMST) change (grey line up to 2017, from the HadCRUT4, GISTEMP, Cowtan–Way, and NOAA datasets) and estimated anthropogenic global warming (solid orange line up to 2017, with orange shading indicating assessed *likely* range). Orange dashed arrow and horizontal orange error bar show respectively central estimate and *likely* range of the time at which 1.5°C is reached if the current rate of warming continues. The grey plume on the right of Panel a) shows the *likely* range of warming responses, computed with a simple climate model, to a stylized pathway (hypothetical future) in which net CO<sub>2</sub> emissions (grey line in panels b and c) decline in a straight line from 2020 to reach net zero in 2055 and net non-CO<sub>2</sub> radiative forcing (grey line in panel d) increases to 2030 and then declines. The blue plume in panel a) shows the response to faster CO<sub>2</sub> emissions reductions (blue line in panel b), reaching net zero in 2040, reducing cumulative CO<sub>2</sub> emissions (panel c). The purple plume shows the response to net CO<sub>2</sub> emissions declining to zero in 2055, with net non-CO<sub>2</sub> forcing remaining constant after 2030. The vertical error bars on right of panel a) show the *likely* ranges (thin lines) and central terciles (33rd – 66th percentiles, thick lines) of the estimated distribution of warming in 2100 under these three stylized pathways. Vertical dotted error bars in panels b, c and d show the *likely* range of historical annual and cumulative global net CO<sub>2</sub> emissions in 2017 (data from the Global Carbon Project) and of net non-CO<sub>2</sub> radiative forcing in 2011 from AR5, respectively. Vertical axes in panels c and d are scaled to represent approximately equal effects on GMST. {1.2.1, 1.2.3, 1.2.4, 2.3, Chapter 1 Figure 1.2 & Chapter 1 Supplementary Material, Cross-Chapter Box 2}

**A3. Climate-related risks for natural and human systems are higher for global warming of 1.5°C than at present, but lower than at 2°C (*high confidence*). These risks depend on the magnitude and rate of warming, geographic location, levels of development and vulnerability, and on the choices and implementation of adaptation and mitigation options (*high confidence*) (Figure SPM.2). {1.3, 3.3, 3.4, 5.6}**

**A3.1.** Impacts on natural and human systems from global warming have already been observed (*high confidence*). Many land and ocean ecosystems and some of the services they provide have already changed due to global warming (*high confidence*). {1.4, 3.4, 3.5, Figure SPM.2}

**A3.2.** Future climate-related risks depend on the rate, peak and duration of warming. In the aggregate they are larger if global warming exceeds 1.5°C before returning to that level by 2100 than if global warming gradually stabilizes at 1.5°C, especially if the peak temperature is high (e.g., about 2°C) (*high confidence*). Some impacts may be long-lasting or irreversible, such as the loss of some ecosystems (*high confidence*). {3.2, 3.4.4, 3.6.3, Cross-Chapter Box 8}

**A3.3.** Adaptation and mitigation are already occurring (*high confidence*). Future climate-related risks would be reduced by the upscaling and acceleration of far-reaching, multi-level and cross-sectoral climate mitigation and by both incremental and transformational adaptation (*high confidence*). {1.2, 1.3, Table 3.5, 4.2.2, Cross-Chapter Box 9 in Chapter 4, Box 4.2, Box 4.3, Box 4.6, 4.3.1, 4.3.2, 4.3.3, 4.3.4, 4.3.5, 4.4.1, 4.4.4, 4.4.5, 4.5.3}

## **B. Projected Climate Change, Potential Impacts and Associated Risks**

**B1. Climate models project robust<sup>7</sup> differences in regional climate characteristics between present-day and global warming of 1.5°C,<sup>8</sup> and between 1.5°C and 2°C.<sup>8</sup> These differences include increases in: mean temperature in most land and ocean regions (*high confidence*), hot extremes in most inhabited regions (*high confidence*), heavy precipitation in several regions (*medium confidence*), and the probability of drought and precipitation deficits in some regions (*medium confidence*). {3.3}**

**B1.1.** Evidence from attributed changes in some climate and weather extremes for a global warming of about 0.5°C supports the assessment that an additional 0.5°C of warming compared to present is associated with further detectable changes in these extremes (*medium confidence*). Several regional changes in climate are assessed to occur with global warming up to 1.5°C compared to pre-industrial levels, including warming of extreme temperatures in many regions (*high confidence*), increases in frequency, intensity, and/or amount of heavy precipitation in several regions (*high confidence*), and an increase in intensity or frequency of droughts in some regions (*medium confidence*). {3.2, 3.3.1, 3.3.2, 3.3.3, 3.3.4, Table 3.2}

**B1.2.** Temperature extremes on land are projected to warm more than GMST (*high confidence*): extreme hot days in mid-latitudes warm by up to about 3°C at global warming of 1.5°C and about

---

<sup>7</sup> Robust is here used to mean that at least two thirds of climate models show the same sign of changes at the grid point scale, and that differences in large regions are statistically significant.

<sup>8</sup> Projected changes in impacts between different levels of global warming are determined with respect to changes in global mean surface air temperature.

4°C at 2°C, and extreme cold nights in high latitudes warm by up to about 4.5°C at 1.5°C and about 6°C at 2°C (*high confidence*). The number of hot days is projected to increase in most land regions, with highest increases in the tropics (*high confidence*). {3.3.1, 3.3.2, Cross-Chapter Box 8 in Chapter 3}

**B1.3.** Risks from droughts and precipitation deficits are projected to be higher at 2°C compared to 1.5°C global warming in some regions (*medium confidence*). Risks from heavy precipitation events are projected to be higher at 2°C compared to 1.5°C global warming in several northern hemisphere high-latitude and/or high-elevation regions, eastern Asia and eastern North America (*medium confidence*). Heavy precipitation associated with tropical cyclones is projected to be higher at 2°C compared to 1.5°C global warming (*medium confidence*). There is generally *low confidence* in projected changes in heavy precipitation at 2°C compared to 1.5°C in other regions. Heavy precipitation when aggregated at global scale is projected to be higher at 2.0°C than at 1.5°C of global warming (*medium confidence*). As a consequence of heavy precipitation, the fraction of the global land area affected by flood hazards is projected to be larger at 2°C compared to 1.5°C of global warming (*medium confidence*). {3.3.1, 3.3.3, 3.3.4, 3.3.5, 3.3.6}

**B2.** By 2100, global mean sea level rise is projected to be around 0.1 metre lower with global warming of 1.5°C compared to 2°C (*medium confidence*). Sea level will continue to rise well beyond 2100 (*high confidence*), and the magnitude and rate of this rise depends on future emission pathways. A slower rate of sea level rise enables greater opportunities for adaptation in the human and ecological systems of small islands, low-lying coastal areas and deltas (*medium confidence*). {3.3, 3.4, 3.6 }

**B2.1.** Model-based projections of global mean sea level rise (relative to 1986-2005) suggest an indicative range of 0.26 to 0.77 m by 2100 for 1.5°C global warming, 0.1 m (0.04-0.16 m) less than for a global warming of 2°C (*medium confidence*). A reduction of 0.1 m in global sea level rise implies that up to 10 million fewer people would be exposed to related risks, based on population in the year 2010 and assuming no adaptation (*medium confidence*). {3.4.4, 3.4.5, 4.3.2}

**B2.2.** Sea level rise will continue beyond 2100 even if global warming is limited to 1.5°C in the 21st century (*high confidence*). Marine ice sheet instability in Antarctica and/or irreversible loss of the Greenland ice sheet could result in multi-metre rise in sea level over hundreds to thousands of years. These instabilities could be triggered around 1.5°C to 2°C of global warming (*medium confidence*). {3.3.9, 3.4.5, 3.5.2, 3.6.3, Box 3.3, Figure SPM.2}

**B2.3.** Increasing warming amplifies the exposure of small islands, low-lying coastal areas and deltas to the risks associated with sea level rise for many human and ecological systems, including increased saltwater intrusion, flooding and damage to infrastructure (*high confidence*). Risks associated with sea level rise are higher at 2°C compared to 1.5°C. The slower rate of sea level rise at global warming of 1.5°C reduces these risks enabling greater opportunities for adaptation including managing and restoring natural coastal ecosystems, and infrastructure reinforcement (*medium confidence*). {3.4.5, Figure SPM.2, Box 3.5}

**B3.** On land, impacts on biodiversity and ecosystems, including species loss and extinction, are projected to be lower at 1.5°C of global warming compared to 2°C. Limiting global warming to 1.5°C compared to 2°C is projected to lower the impacts on terrestrial, freshwater, and coastal ecosystems and to retain more of their services to humans (*high confidence*). (Figure SPM.2) {3.4, 3.5, Box 3.4, Box 4.2, Cross-Chapter Box 8 in Chapter 3}

**B3.1.** Of 105,000 species studied,<sup>9</sup> 6% of insects, 8% of plants and 4% of vertebrates are projected to lose over half of their climatically determined geographic range for global warming of 1.5°C, compared with 18% of insects, 16% of plants and 8% of vertebrates for global warming of 2°C (*medium confidence*). Impacts associated with other biodiversity-related risks such as forest fires, and the spread of invasive species, are lower at 1.5°C compared to 2°C of global warming (*high confidence*). {3.4.3, 3.5.2}

**B3.2.** Approximately 4% (interquartile range 2–7%) of the global terrestrial land area is projected to undergo a transformation of ecosystems from one type to another at 1°C of global warming, compared with 13% (interquartile range 8–20%) at 2°C (*medium confidence*). This indicates that the area at risk is projected to be approximately 50% lower at 1.5°C compared to 2°C (*medium confidence*). {3.4.3.1, 3.4.3.5}

**B3.3.** High-latitude tundra and boreal forests are particularly at risk of climate change-induced degradation and loss, with woody shrubs already encroaching into the tundra (*high confidence*) and will proceed with further warming. Limiting global warming to 1.5°C rather than 2°C is projected to prevent the thawing over centuries of a permafrost area in the range of 1.5 to 2.5 million km<sup>2</sup> (*medium confidence*). {3.3.2, 3.4.3, 3.5.5}

**B4. Limiting global warming to 1.5°C compared to 2°C is projected to reduce increases in ocean temperature as well as associated increases in ocean acidity and decreases in ocean oxygen levels (*high confidence*). Consequently, limiting global warming to 1.5°C is projected to reduce risks to marine biodiversity, fisheries, and ecosystems, and their functions and services to humans, as illustrated by recent changes to Arctic sea ice and warm water coral reef ecosystems (*high confidence*). {3.3, 3.4, 3.5, Boxes 3.4, 3.5}**

**B4.1.** There is *high confidence* that the probability of a sea-ice-free Arctic Ocean during summer is substantially lower at global warming of 1.5°C when compared to 2°C. With 1.5°C of global warming, one sea ice-free Arctic summer is projected per century. This likelihood is increased to at least one per decade with 2°C global warming. Effects of a temperature overshoot are reversible for Arctic sea ice cover on decadal time scales (*high confidence*). {3.3.8, 3.4.4.7}

**B4.2.** Global warming of 1.5°C is projected to shift the ranges of many marine species, to higher latitudes as well as increase the amount of damage to many ecosystems. It is also expected to drive the loss of coastal resources, and reduce the productivity of fisheries and aquaculture (especially at low latitudes). The risks of climate-induced impacts are projected to be higher at 2°C than those at global warming of 1.5°C (*high confidence*). Coral reefs, for example, are projected to decline by a further 70–90% at 1.5°C (*high confidence*) with larger losses (>99%) at 2°C (*very high confidence*). The risk of irreversible loss of many marine and coastal ecosystems increases with global warming, especially at 2°C or more (*high confidence*). {3.4.4, Box 3.4}

**B4.3.** The level of ocean acidification due to increasing CO<sub>2</sub> concentrations associated with global warming of 1.5°C is projected to amplify the adverse effects of warming, and even further at 2°C,

---

<sup>9</sup> Consistent with earlier studies, illustrative numbers were adopted from one recent meta-study.

impacting the growth, development, calcification, survival, and thus abundance of a broad range of species, e.g., from algae to fish (*high confidence*). {3.3.10, 3.4.4}

**B4.4.** Impacts of climate change in the ocean are increasing risks to fisheries and aquaculture via impacts on the physiology, survivorship, habitat, reproduction, disease incidence, and risk of invasive species (*medium confidence*) but are projected to be less at 1.5°C of global warming than at 2°C. One global fishery model, for example, projected a decrease in global annual catch for marine fisheries of about 1.5 million tonnes for 1.5°C of global warming compared to a loss of more than 3 million tonnes for 2°C of global warming (*medium confidence*). {3.4.4, Box 3.4}

**B5. Climate-related risks to health, livelihoods, food security, water supply, human security, and economic growth are projected to increase with global warming of 1.5°C and increase further with 2°C. (Figure SPM.2) {3.4, 3.5, 5.2, Box 3.2, Box 3.3, Box 3.5, Box 3.6, Cross-Chapter Box 6 in Chapter 3, Cross-Chapter Box 9 in Chapter 4, Cross-Chapter Box 12 in Chapter 5, 5.2}**

**B5.1.** Populations at disproportionately higher risk of adverse consequences of global warming of 1.5°C and beyond include disadvantaged and vulnerable populations, some indigenous peoples, and local communities dependent on agricultural or coastal livelihoods (*high confidence*). Regions at disproportionately higher risk include Arctic ecosystems, dryland regions, small-island developing states, and least developed countries (*high confidence*). Poverty and disadvantages are expected to increase in some populations as global warming increases; limiting global warming to 1.5°C, compared with 2°C, could reduce the number of people both exposed to climate-related risks and susceptible to poverty by up to several hundred million by 2050 (*medium confidence*). {3.4.10, 3.4.11, Box 3.5, Cross-Chapter Box 6 in Chapter 3, Cross-Chapter Box 9 in Chapter 4, Cross-Chapter Box 12 in Chapter 5, 4.2.2.2, 5.2.1, 5.2.2, 5.2.3, 5.6.3}

**B5.2.** Any increase in global warming is projected to affect human health, with primarily negative consequences (*high confidence*). Lower risks are projected at 1.5°C than at 2°C for heat-related morbidity and mortality (*very high confidence*) and for ozone-related mortality if emissions needed for ozone formation remain high (*high confidence*). Urban heat islands often amplify the impacts of heatwaves in cities (*high confidence*). Risks from some vector-borne diseases, such as malaria and dengue fever, are projected to increase with warming from 1.5°C to 2°C, including potential shifts in their geographic range (*high confidence*). {3.4.7, 3.4.8, 3.5.5.8}

**B5.3.** Limiting warming to 1.5°C, compared with 2°C, is projected to result in smaller net reductions in yields of maize, rice, wheat, and potentially other cereal crops, particularly in sub-Saharan Africa, Southeast Asia, and Central and South America; and in the CO<sub>2</sub> dependent, nutritional quality of rice and wheat (*high confidence*). Reductions in projected food availability are larger at 2°C than at 1.5°C of global warming in the Sahel, southern Africa, the Mediterranean, central Europe, and the Amazon (*medium confidence*). Livestock are projected to be adversely affected with rising temperatures, depending on the extent of changes in feed quality, spread of diseases, and water resource availability (*high confidence*). {3.4.6, 3.5.4, 3.5.5, Box 3.1, Cross-Chapter Box 6 in Chapter 3, Cross-Chapter Box 9 in Chapter 4}

**B5.4.** Depending on future socioeconomic conditions, limiting global warming to 1.5°C, compared to 2°C, may reduce the proportion of the world population exposed to a climate-change induced increase in water stress by up to 50%, although there is considerable variability between regions (*medium confidence*). Many small island developing states would experience lower water stress as a

result of projected changes in aridity when global warming is limited to 1.5°C, as compared to 2°C (*medium confidence*). {3.3.5, 3.4.2, 3.4.8, 3.5.5, Box 3.2, Box 3.5, Cross-Chapter Box 9 in Chapter 4}

**B5.5.** Risks to global aggregated economic growth due to climate change impacts are projected to be lower at 1.5°C than at 2°C by the end of this century<sup>10</sup> (*medium confidence*). This excludes the costs of mitigation, adaptation investments and the benefits of adaptation. Countries in the tropics and Southern Hemisphere subtropics are projected to experience the largest impacts on economic growth due to climate change should global warming increase from 1.5°C to 2 °C (*medium confidence*). {3.5.2, 3.5.3}

**B5.6.** Exposure to multiple and compound climate-related risks increases between 1.5°C and 2°C of global warming, with greater proportions of people both so exposed and susceptible to poverty in Africa and Asia (*high confidence*). For global warming from 1.5°C to 2°C, risks across energy, food, and water sectors could overlap spatially and temporally, creating new and exacerbating current hazards, exposures, and vulnerabilities that could affect increasing numbers of people and regions (*medium confidence*). {Box 3.5, 3.3.1, 3.4.5.3, 3.4.5.6, 3.4.11, 3.5.4.9}

**B5.7.** There are multiple lines of evidence that since the AR5 the assessed levels of risk increased for four of the five Reasons for Concern (RFCs) for global warming to 2°C (*high confidence*). The risk transitions by degrees of global warming are now: from high to very high between 1.5°C and 2°C for RFC1 (Unique and threatened systems) (*high confidence*); from moderate to high risk between 1.0°C and 1.5°C for RFC2 (Extreme weather events) (*medium confidence*); from moderate to high risk between 1.5°C and 2°C for RFC3 (Distribution of impacts) (*high confidence*); from moderate to high risk between 1.5°C and 2.5°C for RFC4 (Global aggregate impacts) (*medium confidence*); and from moderate to high risk between 1°C and 2.5°C for RFC5 (Large-scale singular events) (*medium confidence*). (Figure SPM.2) {3.4.13; 3.5, 3.5.2}

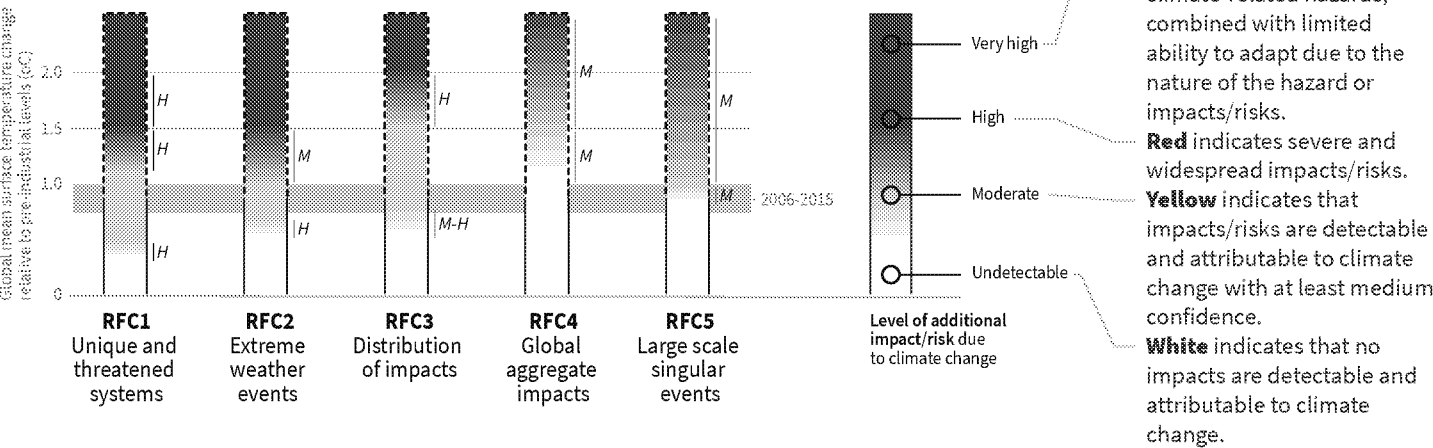
---

<sup>10</sup> Here, impacts on economic growth refer to changes in GDP. Many impacts, such as loss of human lives, cultural heritage, and ecosystem services, are difficult to value and monetize.

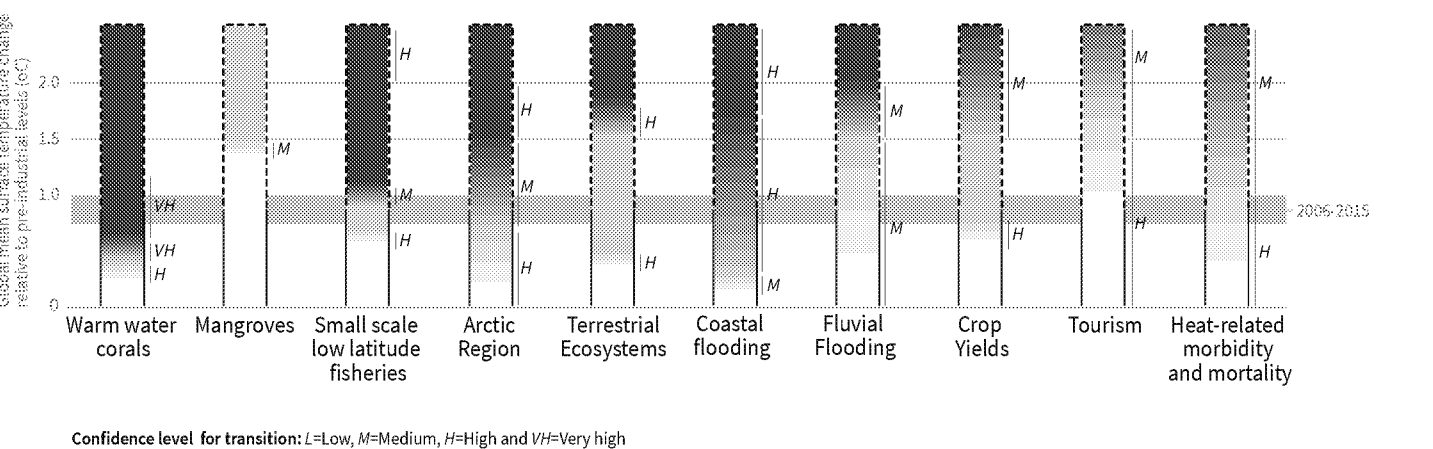
# How the level of global warming affects impacts and/or risks associated with the Reasons for Concern (RFCs) and selected natural, managed and human systems

Five Reasons For Concern (RFCs) illustrate the impacts and risks of different levels of global warming for people, economies and ecosystems across sectors and regions.

Impacts and risks associated with the Reasons for Concern (RFCs)



Impacts and risks for selected natural, managed and human systems



Confidence level for transition: L=Low, M=Medium, H=High and VH=Very high

**Figure SPM.2:** Five integrative reasons for concern (RFCs) provide a framework for summarizing key impacts and risks across sectors and regions, and were introduced in the IPCC Third Assessment Report. RFCs illustrate the implications of global warming for people, economies, and ecosystems. Impacts and/or risks for each RFC are based on assessment of the new literature that has appeared. As in the AR5, this literature was used to make expert judgments to assess the levels of global warming at which levels of impact and/or risk are undetectable, moderate, high or very high. The selection of impacts and risks to natural, managed and human systems in the lower panel is illustrative and is not intended to be fully comprehensive. **RFC1 Unique and threatened systems:** ecological and human systems that have restricted geographic ranges constrained by climate related conditions and have high endemism or other distinctive properties. Examples include coral reefs, the Arctic and its indigenous people, mountain glaciers, and biodiversity hotspots. **RFC2 Extreme weather events:** risks/impacts to human health, livelihoods, assets, and ecosystems from extreme weather events such as heat waves, heavy rain, drought and associated wildfires, and coastal flooding. **RFC3 Distribution of impacts:** risks/impacts that disproportionately affect particular groups due to uneven distribution of physical climate change hazards, exposure or vulnerability. **RFC4 Global aggregate impacts:** global monetary damage, global scale degradation and loss of ecosystems and biodiversity. **RFC5 Large-scale singular events:** are relatively large, abrupt and sometimes irreversible changes in systems that are caused by global warming. Examples include disintegration of the Greenland and Antarctic ice sheets. {3.4, 3.5, 3.5.2.1, 3.5.2.2, 3.5.2.3, 3.5.2.4, 3.5.2.5, 5.4.1 5.5.3, 5.6.1, Box 3.4}

**B6. Most adaptation needs will be lower for global warming of 1.5°C compared to 2°C (*high confidence*). There are a wide range of adaptation options that can reduce the risks of climate change (*high confidence*). There are limits to adaptation and adaptive capacity for some human and natural systems at global warming of 1.5°C, with associated losses (*medium confidence*). The number and availability of adaptation options vary by sector (*medium confidence*). {Table 3.5, 4.3, 4.5, Cross-Chapter Box 9 in Chapter 4, Cross-Chapter Box 12 in Chapter 5}**

**B6.1.** A wide range of adaptation options are available to reduce the risks to natural and managed ecosystems (e.g., ecosystem-based adaptation, ecosystem restoration and avoided degradation and deforestation, biodiversity management, sustainable aquaculture, and local knowledge and indigenous knowledge), the risks of sea level rise (e.g., coastal defence and hardening), and the risks to health, livelihoods, food, water, and economic growth, especially in rural landscapes (e.g., efficient irrigation, social safety nets, disaster risk management, risk spreading and sharing, community-based adaptation) and urban areas (e.g., green infrastructure, sustainable land use and planning, and sustainable water management) (*medium confidence*). {4.3.1, 4.3.2, 4.3.3, 4.3.5, 4.5.3, 4.5.4, 5.3.2, Box 4.2, Box 4.3, Box 4.6, Cross-Chapter Box 9 in Chapter 4}.

**B6.2.** Adaptation is expected to be more challenging for ecosystems, food and health systems at 2°C of global warming than for 1.5°C (*medium confidence*). Some vulnerable regions, including small islands and Least Developed Countries, are projected to experience high multiple interrelated climate risks even at global warming of 1.5°C (*high confidence*). {3.3.1, 3.4.5, Box 3.5, Table 3.5, Cross-Chapter Box 9 in Chapter 4, 5.6, Cross-Chapter Box 12 in Chapter 5, Box 5.3}

**B6.3.** Limits to adaptive capacity exist at 1.5°C of global warming, become more pronounced at higher levels of warming and vary by sector, with site-specific implications for vulnerable regions, ecosystems, and human health (*medium confidence*) {Cross-Chapter Box 12 in Chapter 5, Box 3.5, Table 3.5}

## **C. Emission Pathways and System Transitions Consistent with 1.5°C Global Warming**

**C1. In model pathways with no or limited overshoot of 1.5°C, global net anthropogenic CO<sub>2</sub> emissions decline by about 45% from 2010 levels by 2030 (40–60% interquartile range), reaching net zero around 2050 (2045–2055 interquartile range). For limiting global warming to below 2°C<sup>11</sup> CO<sub>2</sub> emissions are projected to decline by about 20% by 2030 in most pathways (10–30% interquartile range) and reach net zero around 2075 (2065–2080 interquartile range). Non-CO<sub>2</sub> emissions in pathways that limit global warming to 1.5°C show deep reductions that are similar to those in pathways limiting warming to 2°C. (*high confidence*) (Figure SPM.3a) {2.1, 2.3, Table 2.4}**

**C1.1.** CO<sub>2</sub> emissions reductions that limit global warming to 1.5°C with no or limited overshoot can involve different portfolios of mitigation measures, striking different balances between lowering energy and resource intensity, rate of decarbonization, and the reliance on carbon dioxide removal. Different portfolios face different implementation challenges, and potential synergies and trade-offs with sustainable development. (*high confidence*). (Figure SPM.3b) {2.3.2, 2.3.4, 2.4, 2.5.3}

---

<sup>11</sup> References to pathways limiting global warming to 2°C are based on a 66% probability of staying below 2°C.

**C1.2.** Modelled pathways that limit global warming to 1.5°C with no or limited overshoot involve deep reductions in emissions of methane and black carbon (35% or more of both by 2050 relative to 2010). These pathways also reduce most of the cooling aerosols, which partially offsets mitigation effects for two to three decades. Non-CO<sub>2</sub> emissions<sup>12</sup> can be reduced as a result of broad mitigation measures in the energy sector. In addition, targeted non-CO<sub>2</sub> mitigation measures can reduce nitrous oxide and methane from agriculture, methane from the waste sector, some sources of black carbon, and hydrofluorocarbons. High bioenergy demand can increase emissions of nitrous oxide in some 1.5°C pathways, highlighting the importance of appropriate management approaches. Improved air quality resulting from projected reductions in many non-CO<sub>2</sub> emissions provide direct and immediate population health benefits in all 1.5°C model pathways. (*high confidence*) (Figure SPM.3a) {2.2.1, 2.3.3, 2.4.4, 2.5.3, 4.3.6, 5.4.2}

**C1.3.** Limiting global warming requires limiting the total cumulative global anthropogenic emissions of CO<sub>2</sub> since the preindustrial period, i.e. staying within a total carbon budget (*high confidence*).<sup>13</sup> By the end of 2017, anthropogenic CO<sub>2</sub> emissions since the preindustrial period are estimated to have reduced the total carbon budget for 1.5°C by approximately 2200 ± 320 GtCO<sub>2</sub> (*medium confidence*). The associated remaining budget is being depleted by current emissions of 42 ± 3 GtCO<sub>2</sub> per year (*high confidence*). The choice of the measure of global temperature affects the estimated remaining carbon budget. Using global mean surface air temperature, as in AR5, gives an estimate of the remaining carbon budget of 580 GtCO<sub>2</sub> for a 50% probability of limiting warming to 1.5°C, and 420 GtCO<sub>2</sub> for a 66% probability (*medium confidence*).<sup>14</sup> Alternatively, using GMST gives estimates of 770 and 570 GtCO<sub>2</sub>, for 50% and 66% probabilities,<sup>15</sup> respectively (*medium confidence*). Uncertainties in the size of these estimated remaining carbon budgets are substantial and depend on several factors. Uncertainties in the climate response to CO<sub>2</sub> and non-CO<sub>2</sub> emissions contribute ±400 GtCO<sub>2</sub> and the level of historic warming contributes ±250 GtCO<sub>2</sub> (*medium confidence*). Potential additional carbon release from future permafrost thawing and methane release from wetlands would reduce budgets by up to 100 GtCO<sub>2</sub> over the course of this century and more thereafter (*medium confidence*). In addition, the level of non-CO<sub>2</sub> mitigation in the future could alter the remaining carbon budget by 250 GtCO<sub>2</sub> in either direction (*medium confidence*). {1.2.4, 2.2.2, 2.6.1, Table 2.2, Chapter 2 Supplementary Material}

**C1.4.** Solar radiation modification (SRM) measures are not included in any of the available assessed pathways. Although some SRM measures may be theoretically effective in reducing an overshoot, they face large uncertainties and knowledge gaps as well as substantial risks,

<sup>12</sup> Non-CO<sub>2</sub> emissions included in this report are all anthropogenic emissions other than CO<sub>2</sub> that result in radiative forcing. These include short-lived climate forcers, such as methane, some fluorinated gases, ozone precursors, aerosols or aerosol precursors, such as black carbon and sulphur dioxide, respectively, as well as long-lived greenhouse gases, such as nitrous oxide or some fluorinated gases. The radiative forcing associated with non-CO<sub>2</sub> emissions and changes in surface albedo is referred to as non-CO<sub>2</sub> radiative forcing. {x,y}

<sup>13</sup> There is a clear scientific basis for a total carbon budget consistent with limiting global warming to 1.5°C. However, neither this total carbon budget nor the fraction of this budget taken up by past emissions were assessed in this report.

<sup>14</sup> Irrespective of the measure of global temperature used, updated understanding and further advances in methods have led to an increase in the estimated remaining carbon budget of about 300 GtCO<sub>2</sub> compared to AR5. (*medium confidence*) {x,y}

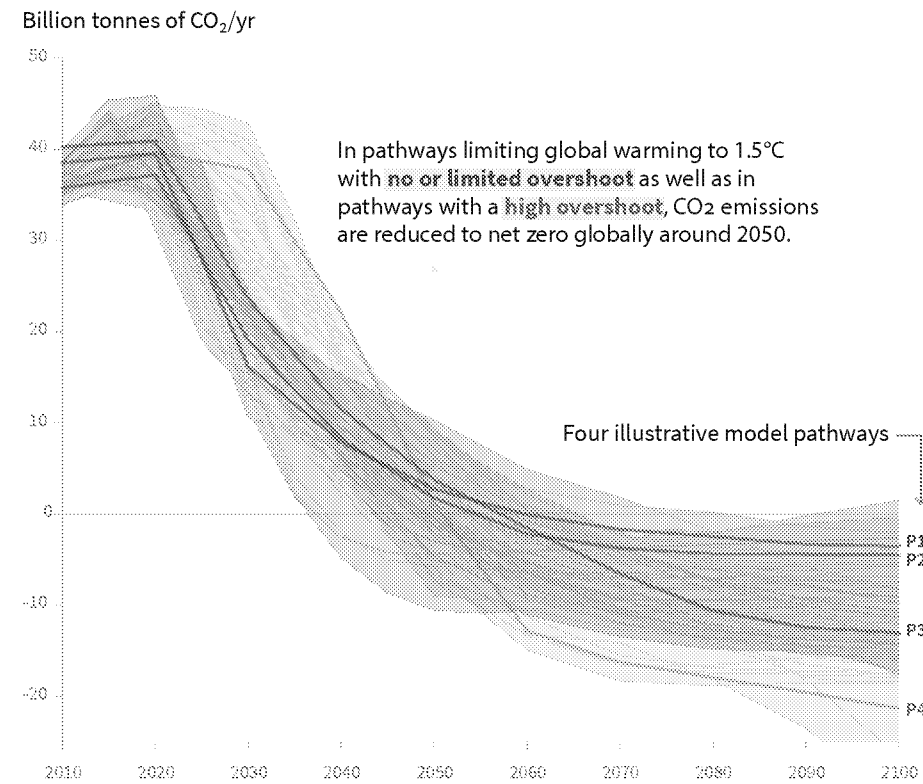
<sup>15</sup> These estimates use observed GMST to 2006–2015 and estimate future temperature changes using near surface air temperatures.

institutional and social constraints to deployment related to governance, ethics, and impacts on sustainable development. They also do not mitigate ocean acidification. (*medium confidence*).  
{4.3.8, Cross-Chapter Box 10 in Chapter 4}

## Global emissions pathway characteristics

General characteristics of the evolution of anthropogenic net emissions of CO<sub>2</sub>, and total emissions of methane, black carbon, and nitrous oxide in model pathways that limit global warming to 1.5°C with no or limited overshoot. Net emissions are defined as anthropogenic emissions reduced by anthropogenic removals. Reductions in net emissions can be achieved through different portfolios of mitigation measures illustrated in Figure SPM3B.

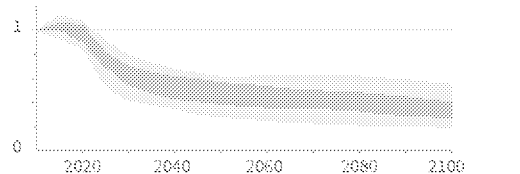
### Global total net CO<sub>2</sub> emissions



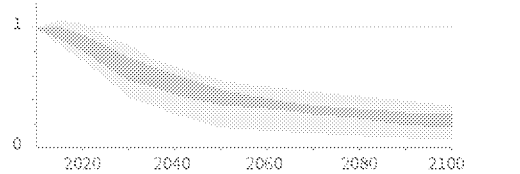
### Non-CO<sub>2</sub> emissions relative to 2010

Emissions of non-CO<sub>2</sub> forcers are also reduced or limited in pathways limiting global warming to 1.5°C with **no or limited overshoot**, but they do not reach zero globally.

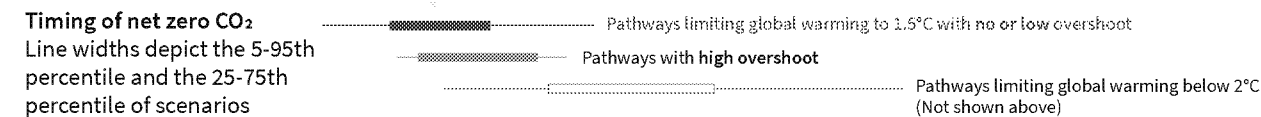
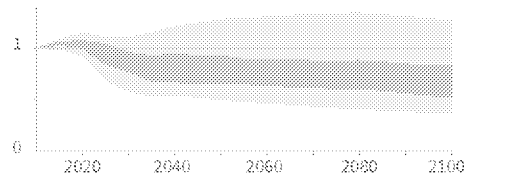
#### Methane emissions



#### Black carbon emissions



#### Nitrous oxide emissions

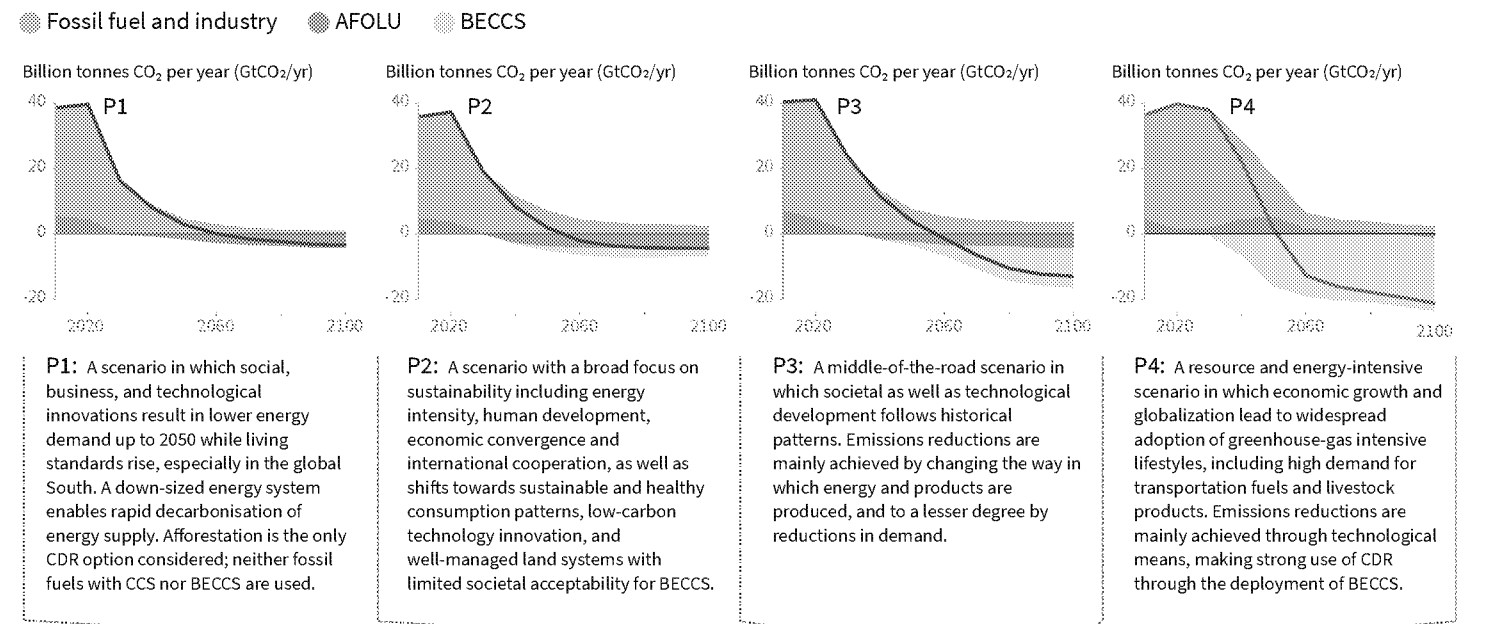


**Figure SPM.3a:** Global emissions pathway characteristics. The main panel shows global net anthropogenic CO<sub>2</sub> emissions in pathways limiting global warming to 1.5°C with no or limited (less than 0.1°C) overshoot and pathways with higher overshoot. The shaded area shows the full range for pathways analysed in this report. The panels on the right show non-CO<sub>2</sub> emissions ranges for three compounds with large historical forcing and a substantial portion of emissions coming from sources distinct from those central to CO<sub>2</sub> mitigation. Shaded areas in these panels show the 5–95% (light shading) and interquartile (dark shading) ranges of pathways limiting global warming to 1.5°C with no or limited overshoot. Box and whiskers at the bottom of the figure show the timing of pathways reaching global net zero CO<sub>2</sub> emission levels, and a comparison with pathways limiting global warming to 2°C with at least 66% probability. Four illustrative model pathways are highlighted in the main panel and are labelled P1, P2, P3 and P4, corresponding to the LED, S1, S2, and S5 pathways assessed in Chapter 2. Descriptions and characteristics of these pathways are available in Figure SPM3b. {2.1, 2.2, 2.3, Figure 2.5, Figure 2.10, Figure 2.11}

Characteristics of four illustrative model pathways

Different mitigation strategies can achieve the net emissions reductions that would be required to follow a pathway that limit global warming to 1.5°C with no or limited overshoot. All pathways use Carbon Dioxide Removal (CDR), but the amount varies across pathways, as do the relative contributions of Bioenergy with Carbon Capture and Storage (BECCS) and removals in the Agriculture, Forestry and Other Land Use (AFOLU) sector. This has implications for the emissions and several other pathway characteristics.

Breakdown of contributions to global net CO<sub>2</sub> emissions in four illustrative model pathways



Global indicators	P1	P2	P3	P4	Interquartile range
Pathway classification	No or low overshoot	No or low overshoot	No or low overshoot	High overshoot	No or low overshoot
CO <sub>2</sub> emission change in 2030 (% rel to 2010)	-58	-47	-41	4	(-59,-40)
↳ in 2050 (% rel to 2010)	-93	-95	-91	-97	(-104,-91)
Kyoto-GHG emissions* in 2030 (% rel to 2010)	-50	-49	-35	-2	(-55,-38)
↳ in 2050 (% rel to 2010)	-82	-89	-78	-80	(-93,-81)
Final energy demand** in 2030 (% rel to 2010)	-15	-5	17	39	(-12, 7)
↳ in 2050 (% rel to 2010)	-32	2	21	44	(-11, 22)
Renewable share in electricity in 2030 (%)	60	58	48	25	(47, 65)
↳ in 2050 (%)	77	81	63	70	(69, 87)
Primary energy from coal in 2030 (% rel to 2010)	-78	-61	-75	-59	(-78, -59)
↳ in 2050 (% rel to 2010)	-97	-77	-73	-97	(-95, -74)
from oil in 2030 (% rel to 2010)	-37	-13	-3	86	(-34,3)
↳ in 2050 (% rel to 2010)	-87	-50	-81	-32	(-78,-31)
from gas in 2030 (% rel to 2010)	-25	-20	33	37	(-26,21)
↳ in 2050 (% rel to 2010)	-74	-53	21	-48	(-56,6)
from nuclear in 2030 (% rel to 2010)	59	83	98	106	(44,102)
↳ in 2050 (% rel to 2010)	150	98	501	468	(91,190)
from biomass in 2030 (% rel to 2010)	-11	0	36	-1	(29,80)
↳ in 2050 (% rel to 2010)	-16	49	121	418	(123,261)
from non-biomass renewables in 2030 (% rel to 2010)	430	470	315	110	(243,438)
↳ in 2050 (% rel to 2010)	832	1327	878	1137	(575,1300)
Cumulative CCS until 2100 (GtCO <sub>2</sub> )	0	348	687	1218	(550, 1017)
↳ of which BECCS (GtCO <sub>2</sub> )	0	151	414	1191	(364, 662)
Land area of bioenergy crops in 2050 (million hectare)	22	93	283	724	(151, 320)
Agricultural CH <sub>4</sub> emissions in 2030 (% rel to 2010)	-24	-48	1	14	(-30,-11)
in 2050 (% rel to 2010)	-33	-69	-23	2	(-46,-23)
Agricultural N <sub>2</sub> O emissions in 2030 (% rel to 2010)	5	-26	15	3	(-21,4)
in 2050 (% rel to 2010)	6	-26	0	39	(-26,1)

NOTE: Indicators have been selected to show global trends identified by the Chapter 2 assessment. National and sectoral characteristics can differ substantially from the global trends shown above.

\* Kyoto-gas emissions are based on SAR GWP-100

\*\* Changes in energy demand are associated with improvements in energy efficiency and behaviour change

**Figure SPM.3b:** Characteristics of four illustrative model pathways in relation to global warming of 1.5°C introduced in Figure SPM3a. These pathways were selected to show a range of potential mitigation approaches and vary widely in their projected energy and land use, as well as their assumptions about future socioeconomic developments, including economic and population growth, equity and sustainability. A breakdown of the global net anthropogenic CO<sub>2</sub> emissions into the contributions in terms of CO<sub>2</sub> emissions from fossil fuel and industry, agriculture, forestry and other land use (AFOLU), and bioenergy with carbon capture and storage (BECCS) is shown. AFOLU estimates reported here are not necessarily comparable with countries’ estimates. Further characteristics for each of these pathways are listed below each pathway. These pathways illustrate relative global differences in mitigation strategies, but do not represent central estimates, national strategies, and do not indicate requirements. For comparison, the right-most column shows the interquartile ranges across pathways with no or limited overshoot of 1.5°C. Pathways P1, P2, P3 and P4, correspond to the LED, S1, S2, and S5 pathways assessed in Chapter 2. (Figure SPM.3a) {2.2.1, 2.3.1, 2.3.2, 2.3.3, 2.3.4, 2.4.1, 2.4.2, 2.4.4, 2.5.3, Figure 2.5, Figure 2.6, Figure 2.9, Figure 2.10, Figure 2.11, Figure 2.14, Figure 2.15, Figure 2.16, Figure 2.17, Figure 2.24, Figure 2.25, Table 2.4, Table 2.6, Table 2.7, Table 2.9, Table 4.1}

**C2. Pathways limiting global warming to 1.5°C with no or limited overshoot would require rapid and far-reaching transitions in energy, land, urban and infrastructure (including transport and buildings), and industrial systems (*high confidence*). These systems transitions are unprecedented in terms of scale, but not necessarily in terms of speed, and imply deep emissions reductions in all sectors, a wide portfolio of mitigation options and a significant upscaling of investments in those options (*medium confidence*). {2.3, 2.4, 2.5, 4.2, 4.3, 4.4, 4.5}**

**C2.1.** Pathways that limit global warming to 1.5°C with no or limited overshoot show system changes that are more rapid and pronounced over the next two decades than in 2°C pathways (*high confidence*). The rates of system changes associated with limiting global warming to 1.5°C with no or limited overshoot have occurred in the past within specific sectors, technologies and spatial contexts, but there is no documented historic precedent for their scale (*medium confidence*). {2.3.3, 2.3.4, 2.4, 2.5, 4.2.1, 4.2.2, Cross-Chapter Box 11 in Chapter 4}

**C2.2.** In energy systems, modelled global pathways (considered in the literature) limiting global warming to 1.5°C with no or limited overshoot (for more details see Figure SPM.3b), generally meet energy service demand with lower energy use, including through enhanced energy efficiency, and show faster electrification of energy end use compared to 2°C (*high confidence*). In 1.5°C pathways with no or limited overshoot, low-emission energy sources are projected to have a higher share, compared with 2°C pathways, particularly before 2050 (*high confidence*). In 1.5°C pathways with no or limited overshoot, renewables are projected to supply 70–85% (interquartile range) of electricity in 2050 (*high confidence*). In electricity generation, shares of nuclear and fossil fuels with carbon dioxide capture and storage (CCS) are modelled to increase in most 1.5°C pathways with no or limited overshoot. In modelled 1.5°C pathways with limited or no overshoot, the use of CCS would allow the electricity generation share of gas to be approximately 8% (3–11% interquartile range) of global electricity in 2050, while the use of coal shows a steep reduction in all pathways and would be reduced to close to 0% (0–2%) of electricity (*high confidence*). While acknowledging the challenges, and differences between the options and national circumstances, political, economic, social and technical feasibility of solar energy, wind energy and electricity storage technologies have substantially improved over the past few years (*high confidence*). These improvements signal a potential system transition in electricity generation (Figure SPM.3b) {2.4.1, 2.4.2, Figure 2.1, Table 2.6, Table 2.7, Cross-Chapter Box 6 in Chapter 3, 4.2.1, 4.3.1, 4.3.3, 4.5.2}

**C2.3.** CO<sub>2</sub> emissions from industry in pathways limiting global warming to 1.5°C with no or limited overshoot are projected to be about 75–90% (interquartile range) lower in 2050 relative to 2010, as compared to 50–80% for global warming of 2°C (*medium confidence*). Such reductions can be achieved through combinations of new and existing technologies and practices, including electrification, hydrogen, sustainable bio-based feedstocks, product substitution, and carbon capture, utilization and storage (CCUS). These options are technically proven at various scales but their large-scale deployment may be limited by economic, financial, human capacity and institutional constraints in specific contexts, and specific characteristics of large-scale industrial installations. In industry, emissions reductions by energy and process efficiency by themselves are insufficient for limiting warming to 1.5°C with no or limited overshoot (*high confidence*). {2.4.3, 4.2.1, Table 4.1, Table 4.3, 4.3.3, 4.3.4, 4.5.2}

**C2.4.** The urban and infrastructure system transition consistent with limiting global warming to 1.5°C with no or limited overshoot would imply, for example, changes in land and urban planning practices, as well as deeper emissions reductions in transport and buildings compared to pathways that limit global warming below 2°C (see 2.4.3; 4.3.3; 4.2.1) (*medium confidence*). Technical

measures and practices enabling deep emissions reductions include various energy efficiency options. In pathways limiting global warming to 1.5°C with no or limited overshoot, the electricity share of energy demand in buildings would be about 55–75% in 2050 compared to 50–70% in 2050 for 2°C global warming (*medium confidence*). In the transport sector, the share of low-emission final energy would rise from less than 5% in 2020 to about 35–65% in 2050 compared to 25–45% for 2°C global warming (*medium confidence*). Economic, institutional and socio-cultural barriers may inhibit these urban and infrastructure system transitions, depending on national, regional and local circumstances, capabilities and the availability of capital (*high confidence*). {2.3.4, 2.4.3, 4.2.1, Table 4.1, 4.3.3, 4.5.2}.

**C2.5.** Transitions in global and regional land use are found in all pathways limiting global warming to 1.5°C with no or limited overshoot, but their scale depends on the pursued mitigation portfolio. Model pathways that limit global warming to 1.5°C with no or limited overshoot project the conversion of 0.5–8 million km<sup>2</sup> of pasture and 0–5 million km<sup>2</sup> of non-pasture agricultural land for food and feed crops into 1–7 million km<sup>2</sup> for energy crops and a 1 million km<sup>2</sup> reduction to 10 million km<sup>2</sup> increase in forests by 2050 relative to 2010 (*medium confidence*).<sup>16</sup> Land use transitions of similar magnitude can be observed in modelled 2°C pathways (*medium confidence*). Such large transitions pose profound challenges for sustainable management of the various demands on land for human settlements, food, livestock feed, fibre, bioenergy, carbon storage, biodiversity and other ecosystem services (*high confidence*). Mitigation options limiting the demand for land include sustainable intensification of land use practices, ecosystem restoration and changes towards less resource-intensive diets (*high confidence*). The implementation of land-based mitigation options would require overcoming socio-economic, institutional, technological, financing and environmental barriers that differ across regions (*high confidence*). {2.4.4, Figure 2.24, 4.3.2, 4.5.2, Cross-Chapter Box 7 in Chapter 3}

**C2.6** Total annual average energy-related mitigation investment for the period 2015 to 2050 in pathways limiting warming to 1.5°C is estimated to be around 900 billion USD<sub>2015</sub> (range of 180 billion to 1800 billion USD<sub>2015</sub> across six models<sup>17</sup>). This corresponds to total annual average energy supply investments of 1600 to 3800 billion USD<sub>2015</sub> and total annual average energy demand investments of 700 to 1000 billion USD<sub>2015</sub> for the period 2015 to 2050, and an increase in total energy-related investments of about 12% (range of 3% to 23%) in 1.5°C pathways relative to 2°C pathways. Average annual investment in low-carbon energy technologies and energy efficiency are upscaled by roughly a factor of five (range of factor of 4 to 5) by 2050 compared to 2015 (*medium confidence*). {2.5.2, Box 4.8, Figure 2.27}

**C2.7.** Modelled pathways limiting global warming to 1.5°C with no or limited overshoot project a wide range of global average discounted marginal abatement costs over the 21st century. They are roughly 3–4 times higher than in pathways limiting global warming to below 2°C (*high confidence*). The economic literature distinguishes marginal abatement costs from total mitigation costs in the economy. The literature on total mitigation costs of 1.5°C mitigation pathways is limited and was not assessed in this report. Knowledge gaps remain in the integrated assessment of the economy wide costs and benefits of mitigation in line with pathways limiting warming to 1.5°C. {2.5.2; 2.6; Figure 2.26}

<sup>16</sup> The projected land use changes presented are not deployed to their upper limits simultaneously in a single pathway.

<sup>17</sup> Including two pathways limiting warming to 1.5°C with no or limited overshoot and four pathways with high overshoot.

**C3.** All pathways that limit global warming to 1.5°C with limited or no overshoot project the use of carbon dioxide removal (CDR) on the order of 100–1000 GtCO<sub>2</sub> over the 21st century. CDR would be used to compensate for residual emissions and, in most cases, achieve net negative emissions to return global warming to 1.5°C following a peak (*high confidence*). CDR deployment of several hundreds of GtCO<sub>2</sub> is subject to multiple feasibility and sustainability constraints (*high confidence*). Significant near-term emissions reductions and measures to lower energy and land demand can limit CDR deployment to a few hundred GtCO<sub>2</sub> without reliance on bioenergy with carbon capture and storage (BECCS) (*high confidence*). {2.3, 2.4, 3.6.2, 4.3, 5.4}

**C3.1.** Existing and potential CDR measures include afforestation and reforestation, land restoration and soil carbon sequestration, BECCS, direct air carbon capture and storage (DACCS), enhanced weathering and ocean alkalization. These differ widely in terms of maturity, potentials, costs, risks, co-benefits and trade-offs (*high confidence*). To date, only a few published pathways include CDR measures other than afforestation and BECCS. {2.3.4, 3.6.2, 4.3.2, 4.3.7}

**C3.2.** In pathways limiting global warming to 1.5°C with limited or no overshoot, BECCS deployment is projected to range from 0–1, 0–8, and 0–16 GtCO<sub>2</sub> yr<sup>-1</sup> in 2030, 2050, and 2100, respectively, while agriculture, forestry and land-use (AFOLU) related CDR measures are projected to remove 0–5, 1–11, and 1–5 GtCO<sub>2</sub> yr<sup>-1</sup> in these years (*medium confidence*). The upper end of these deployment ranges by mid-century exceeds the BECCS potential of up to 5 GtCO<sub>2</sub> yr<sup>-1</sup> and afforestation potential of up to 3.6 GtCO<sub>2</sub> yr<sup>-1</sup> assessed based on recent literature (*medium confidence*). Some pathways avoid BECCS deployment completely through demand-side measures and greater reliance on AFOLU-related CDR measures (*medium confidence*). The use of bioenergy can be as high or even higher when BECCS is excluded compared to when it is included due to its potential for replacing fossil fuels across sectors (*high confidence*). (Figure SPM.3b) {2.3.3, 2.3.4, 2.4.2, 3.6.2, 4.3.1, 4.2.3, 4.3.2, 4.3.7, 4.4.3, Table 2.4}

**C3.3.** Pathways that overshoot 1.5°C of global warming rely on CDR exceeding residual CO<sub>2</sub> emissions later in the century to return to below 1.5°C by 2100, with larger overshoots requiring greater amounts of CDR (Figure SPM.3b). (*high confidence*). Limitations on the speed, scale, and societal acceptability of CDR deployment hence determine the ability to return global warming to below 1.5°C following an overshoot. Carbon cycle and climate system understanding is still limited about the effectiveness of net negative emissions to reduce temperatures after they peak (*high confidence*). {2.2, 2.3.4, 2.3.5, 2.6, 4.3.7, 4.5.2, Table 4.11}

**C3.4.** Most current and potential CDR measures could have significant impacts on land, energy, water, or nutrients if deployed at large scale (*high confidence*). Afforestation and bioenergy may compete with other land uses and may have significant impacts on agricultural and food systems, biodiversity and other ecosystem functions and services (*high confidence*). Effective governance is needed to limit such trade-offs and ensure permanence of carbon removal in terrestrial, geological and ocean reservoirs (*high confidence*). Feasibility and sustainability of CDR use could be enhanced by a portfolio of options deployed at substantial, but lesser scales, rather than a single option at very large scale (*high confidence*). (Figure SPM.3b). {2.3.4, 2.4.4, 2.5.3, 2.6, 3.6.2, 4.3.2, 4.3.7, 4.5.2, 5.4.1, 5.4.2; Cross-Chapter Boxes 7 and 8 in Chapter 3, Table 4.11, Table 5.3, Figure 5.3}

**C3.5.** Some AFOLU-related CDR measures such as restoration of natural ecosystems and soil carbon sequestration could provide co-benefits such as improved biodiversity, soil quality, and local

food security. If deployed at large scale, they would require governance systems enabling sustainable land management to conserve and protect land carbon stocks and other ecosystem functions and services (*medium confidence*). (Figure SPM.4) {2.3.3, 2.3.4, 2.4.2, 2.4.4, 3.6.2, 5.4.1, Cross-Chapter Boxes 3 in Chapter 1 and 7 in Chapter 3, 4.3.2, 4.3.7, 4.4.1, 4.5.2, Table 2.4}

## **D. Strengthening the Global Response in the Context of Sustainable Development and Efforts to Eradicate Poverty**

**D1. Estimates of the global emissions outcome of current nationally stated mitigation ambitions as submitted under the Paris Agreement would lead to global greenhouse gas emissions<sup>18</sup> in 2030 of 52–58 GtCO<sub>2</sub>eq yr<sup>-1</sup> (*medium confidence*). Pathways reflecting these ambitions would not limit global warming to 1.5°C, even if supplemented by very challenging increases in the scale and ambition of emissions reductions after 2030 (*high confidence*). Avoiding overshoot and reliance on future large-scale deployment of carbon dioxide removal (CDR) can only be achieved if global CO<sub>2</sub> emissions start to decline well before 2030 (*high confidence*). {1.2, 2.3, 3.3, 3.4, 4.2, 4.4, Cross-Chapter Box 11 in Chapter 4}**

**D1.1.** Pathways that limit global warming to 1.5°C with no or limited overshoot show clear emission reductions by 2030 (*high confidence*). All but one show a decline in global greenhouse gas emissions to below 35 GtCO<sub>2</sub>eq yr<sup>-1</sup> in 2030, and half of available pathways fall within the 25–30 GtCO<sub>2</sub>eq yr<sup>-1</sup> range (interquartile range), a 40–50% reduction from 2010 levels (*high confidence*). Pathways reflecting current nationally stated mitigation ambition until 2030 are broadly consistent with cost-effective pathways that result in a global warming of about 3°C by 2100, with warming continuing afterwards (*medium confidence*). {2.3.3, 2.3.5, Cross-Chapter Box 11 in Chapter 4, 5.5.3.2}

**D1.2.** Overshoot trajectories result in higher impacts and associated challenges compared to pathways that limit global warming to 1.5°C with no or limited overshoot (*high confidence*). Reversing warming after an overshoot of 0.2°C or larger during this century would require upscaling and deployment of CDR at rates and volumes that might not be achievable given considerable implementation challenges (*medium confidence*). {1.3.3, 2.3.4, 2.3.5, 2.5.1, 3.3, 4.3.7, Cross-Chapter Box 8 in Chapter 3, Cross-Chapter Box 11 in Chapter 4}

**D1.3.** The lower the emissions in 2030, the lower the challenge in limiting global warming to 1.5°C after 2030 with no or limited overshoot (*high confidence*). The challenges from delayed actions to reduce greenhouse gas emissions include the risk of cost escalation, lock-in in carbon-emitting infrastructure, stranded assets, and reduced flexibility in future response options in the medium to long-term (*high confidence*). These may increase uneven distributional impacts between countries at different stages of development (*medium confidence*). {2.3.5, 4.4.5, 5.4.2}

**D2. The avoided climate change impacts on sustainable development, eradication of poverty and reducing inequalities would be greater if global warming were limited to 1.5°C rather than 2°C, if mitigation and adaptation synergies are maximized while trade-offs are minimized (*high confidence*). {1.1, 1.4, 2.5, 3.3, 3.4, 5.2, Table 5.1}**

---

<sup>18</sup> GHG emissions have been aggregated with 100-year GWP values as introduced in the IPCC Second Assessment Report

**D2.1.** Climate change impacts and responses are closely linked to sustainable development which balances social well-being, economic prosperity and environmental protection. The United Nations Sustainable Development Goals (SDGs), adopted in 2015, provide an established framework for assessing the links between global warming of 1.5°C or 2°C and development goals that include poverty eradication, reducing inequalities, and climate action (*high confidence*) {Cross-Chapter Box 4 in Chapter 1, 1.4, 5.1}

**D2.2.** The consideration of ethics and equity can help address the uneven distribution of adverse impacts associated with 1.5°C and higher levels of global warming, as well as those from mitigation and adaptation, particularly for poor and disadvantaged populations, in all societies (*high confidence*). {1.1.1, 1.1.2, 1.4.3, 2.5.3, 3.4.10, 5.1, 5.2, 5.3, 5.4, Cross-Chapter Box 4 in Chapter 1, Cross-Chapter Boxes 6 and 8 in Chapter 3, and Cross-Chapter Box 12 in Chapter 5}

**D2.3.** Mitigation and adaptation consistent with limiting global warming to 1.5°C are underpinned by enabling conditions, assessed in SR1.5 across the geophysical, environmental-ecological, technological, economic, socio-cultural and institutional dimensions of feasibility. Strengthened multi-level governance, institutional capacity, policy instruments, technological innovation and transfer and mobilization of finance, and changes in human behaviour and lifestyles are enabling conditions that enhance the feasibility of mitigation and adaptation options for 1.5°C consistent systems transitions. (*high confidence*) {1.4, Cross-Chapter Box 3 in Chapter 1, 4.4, 4.5, 5.6}

**D3. Adaptation options specific to national contexts, if carefully selected together with enabling conditions, will have benefits for sustainable development and poverty reduction with global warming of 1.5°C, although trade-offs are possible (*high confidence*). {1.4, 4.3, 4.5}**

**D3.1.** Adaptation options that reduce the vulnerability of human and natural systems have many synergies with sustainable development, if well managed, such as ensuring food and water security, reducing disaster risks, improving health conditions, maintaining ecosystem services and reducing poverty and inequality (*high confidence*). Increasing investment in physical and social infrastructure is a key enabling condition to enhance the resilience and the adaptive capacities of societies. These benefits can occur in most regions with adaptation to 1.5°C of global warming (*high confidence*). {1.4.3, 4.2.2, 4.3.1, 4.3.2, 4.3.3, 4.3.5, 4.4.1, 4.4.3, 4.5.3, 5.3.1, 5.3.2}

**D3.2.** Adaptation to 1.5°C global warming can also result in trade-offs or maladaptations with adverse impacts for sustainable development. For example, if poorly designed or implemented, adaptation projects in a range of sectors can increase greenhouse gas emissions and water use, increase gender and social inequality, undermine health conditions, and encroach on natural ecosystems (*high confidence*). These trade-offs can be reduced by adaptations that include attention to poverty and sustainable development (*high confidence*). {4.3.2, 4.3.3, 4.5.4, 5.3.2; Cross-Chapter Boxes 6 and 7 in Chapter 3}

**D3.3.** A mix of adaptation and mitigation options to limit global warming to 1.5°C, implemented in a participatory and integrated manner, can enable rapid, systemic transitions in urban and rural areas (*high confidence*). These are most effective when aligned with economic and sustainable development, and when local and regional governments and decision makers are supported by national governments (*medium confidence*) {4.3.2, 4.3.3, 4.4.1, 4.4.2}

**D3.4.** Adaptation options that also mitigate emissions can provide synergies and cost savings in most sectors and system transitions, such as when land management reduces emissions and disaster

risk, or when low carbon buildings are also designed for efficient cooling. Trade-offs between mitigation and adaptation, when limiting global warming to 1.5°C, such as when bioenergy crops, reforestation or afforestation encroach on land needed for agricultural adaptation, can undermine food security, livelihoods, ecosystem functions and services and other aspects of sustainable development. (*high confidence*) {3.4.3, 4.3.2, 4.3.4, 4.4.1, 4.5.2, 4.5.3, 4.5.4}

**D4. Mitigation options consistent with 1.5°C pathways are associated with multiple synergies and trade-offs across the Sustainable Development Goals (SDGs). While the total number of possible synergies exceeds the number of trade-offs, their net effect will depend on the pace and magnitude of changes, the composition of the mitigation portfolio and the management of the transition. (*high confidence*) (Figure SPM.4) {2.5, 4.5, 5.4}**

**D4.1.** 1.5°C pathways have robust synergies particularly for the SDGs 3 (health), 7 (clean energy), 11 (cities and communities), 12 (responsible consumption and production), and 14 (oceans) (*very high confidence*). Some 1.5°C pathways show potential trade-offs with mitigation for SDGs 1 (poverty), 2 (hunger), 6 (water), and 7 (energy access), if not carefully managed (*high confidence*) (Figure SPM.4). {5.4.2; Figure 5.4, Cross-Chapter Boxes 7 and 8 in Chapter 3}

**D4.2.** 1.5°C pathways that include low energy demand (e.g., see P1 in Figure SPM.3a and SPM.3b), low material consumption, and low GHG-intensive food consumption have the most pronounced synergies and the lowest number of trade-offs with respect to sustainable development and the SDGs (*high confidence*). Such pathways would reduce dependence on CDR. In modelled pathways sustainable development, eradicating poverty and reducing inequality can support limiting warming to 1.5°C. (*high confidence*) (Figure SPM.3b, Figure SPM.4) {2.4.3, 2.5.1, 2.5.3, Figure 2.4, Figure 2.28, 5.4.1, 5.4.2, Figure 5.4}

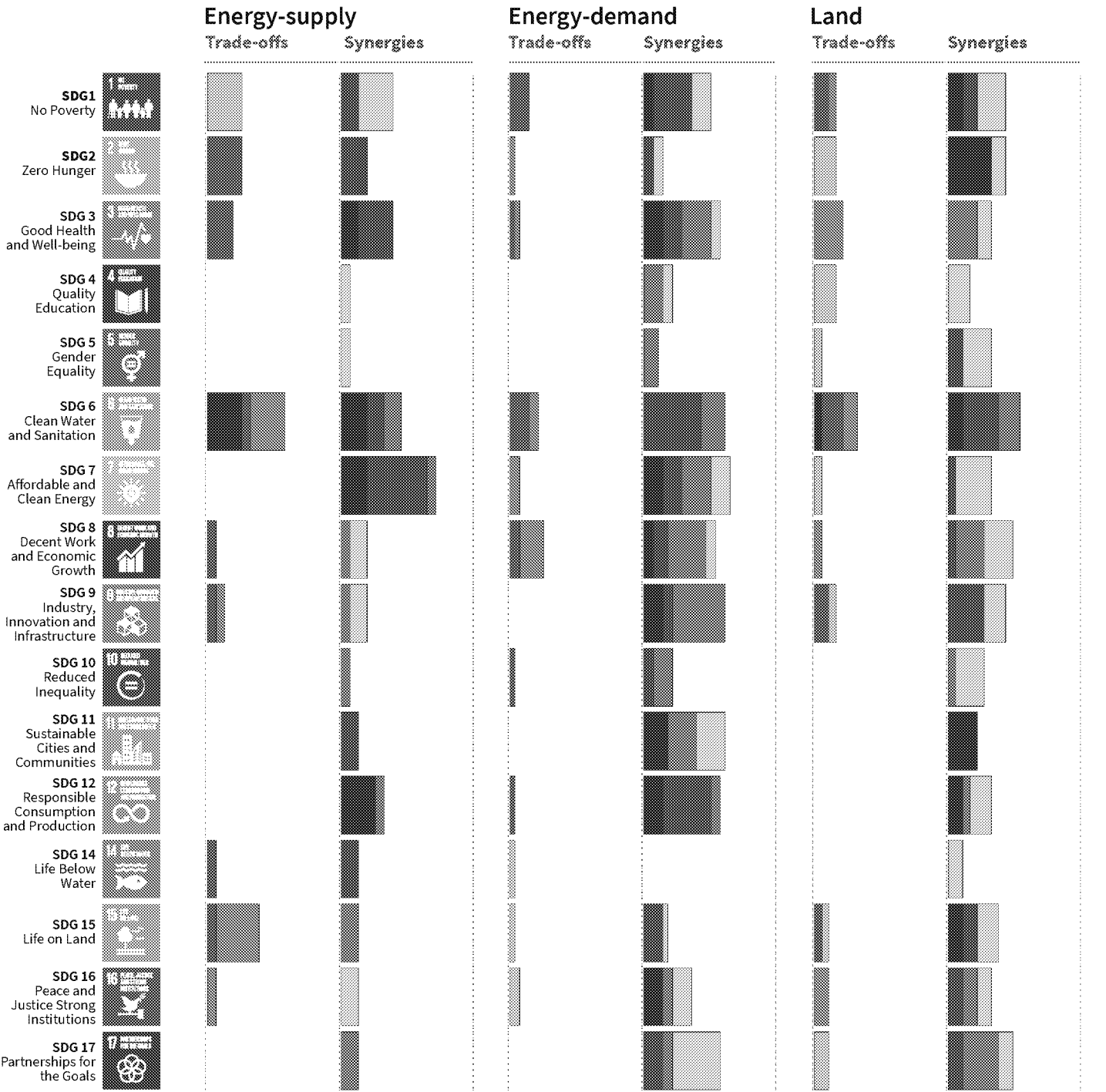
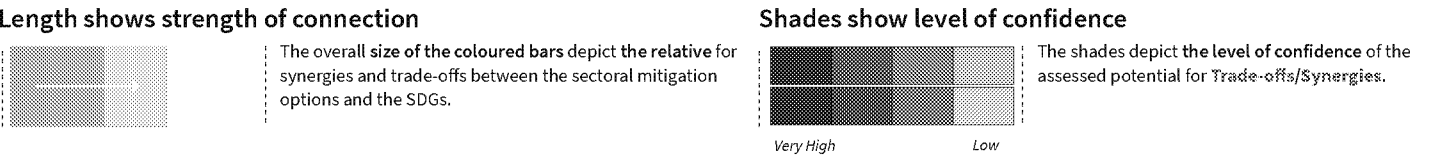
**D4.3.** 1.5°C and 2°C modelled pathways often rely on the deployment of large-scale land-related measures like afforestation and bioenergy supply, which, if poorly managed, can compete with food production and hence raise food security concerns (*high confidence*). The impacts of carbon dioxide removal (CDR) options on SDGs depend on the type of options and the scale of deployment (*high confidence*). If poorly implemented, CDR options such as BECCS and AFOLU options would lead to trade-offs. Context-relevant design and implementation requires considering people's needs, biodiversity, and other sustainable development dimensions (*very high confidence*). {Figure SPM.4, 5.4.1.3, Cross-Chapter Box 7 in Chapter 3}

**D4.4.** Mitigation consistent with 1.5°C pathways creates risks for sustainable development in regions with high dependency on fossil fuels for revenue and employment generation (*high confidence*). Policies that promote diversification of the economy and the energy sector can address the associated challenges (*high confidence*). {5.4.1.2, Box 5.2}

**D4.5.** Redistributive policies across sectors and populations that shield the poor and vulnerable can resolve trade-offs for a range of SDGs, particularly hunger, poverty and energy access. Investment needs for such complementary policies are only a small fraction of the overall mitigation investments in 1.5°C pathways. (*high confidence*) {2.4.3, 5.4.2, Figure 5.5}

Indicative linkages between mitigation options and sustainable development using SDGs (The linkages do not show costs and benefits)

Mitigation options deployed in each sector can be associated with potential positive effects (synergies) or negative effects (trade-offs) with the Sustainable Development Goals (SDGs). The degree to which this potential is realized will depend on the selected portfolio of mitigation options, mitigation policy design, and local circumstances and context. Particularly in the energy-demand sector, the potential for synergies is larger than for trade-offs. The bars group individually assessed options by level of confidence and take into account the relative strength of the assessed mitigation-SDG connections.



**Figure SPM.4:** Potential synergies and trade-offs between the sectoral portfolio of climate change mitigation options and the Sustainable Development Goals (SDGs). The SDGs serve as an analytical framework for the assessment of the different sustainable development dimensions, which extend beyond the time frame of the 2030 SDG targets. The assessment is based on literature on mitigation options that are considered relevant for 1.5°C. The assessed strength of the SDG interactions is based on the qualitative and quantitative assessment of individual mitigation options listed in Table 5.2. For each mitigation option, the strength of the SDG-connection as well as the associated confidence of the underlying literature (shades of green and red) was assessed. The strength of positive connections (synergies) and negative connections (trade-offs) across all individual options within a sector (see Table 5.2) are aggregated into sectoral potentials for the whole mitigation portfolio. The (white) areas outside the bars, which indicate no interactions, have *low confidence* due to the uncertainty and limited number of studies exploring indirect effects. The strength of the connection considers only the effect of mitigation and does not include benefits of avoided impacts. SDG 13 (climate action) is not listed because mitigation is being considered in terms of interactions with SDGs and not vice versa. The bars denote the strength of the connection, and do not consider the strength of the impact on the SDGs. The energy demand sector comprises behavioural responses, fuel switching and efficiency options in the transport, industry and building sector as well as carbon capture options in the industry sector. Options assessed in the energy supply sector comprise biomass and non-biomass renewables, nuclear, CCS with bio-energy, and CCS with fossil fuels. Options in the land sector comprise agricultural and forest options, sustainable diets & reduced food waste, soil sequestration, livestock & manure management, reduced deforestation, afforestation & reforestation, responsible sourcing. In addition to this figure, options in the ocean sector are discussed in the underlying report. {5.4, Table 5.2, Figure 5.2}

**Statement for knowledge gap:**

Information about the net impacts of mitigation on sustainable development in 1.5°C pathways is available only for a limited number of SDGs and mitigation options. Only a limited number of studies have assessed the benefits of avoided climate change impacts of 1.5°C pathways for the SDGs, and the co-effects of adaptation for mitigation and the SDGs. The assessment of the indicative mitigation potentials in Figure SPM.4 is a step further from AR5 towards a more comprehensive and integrated assessment in the future.

**D5. Limiting the risks from global warming of 1.5°C in the context of sustainable development and poverty eradication implies system transitions that can be enabled by an increase of adaptation and mitigation investments, policy instruments, the acceleration of technological innovation and behaviour changes (*high confidence*). {2.3, 2.4, 2.5, 3.2, 4.2, 4.4, 4.5, 5.2, 5.5, 5.6}**

**D5.1.** Directing finance towards investment in infrastructure for mitigation and adaptation could provide additional resources. This could involve the mobilization of private funds by institutional investors, asset managers and development or investment banks, as well as the provision of public funds. Government policies that lower the risk of low-emission and adaptation investments can facilitate the mobilization of private funds and enhance the effectiveness of other public policies. Studies indicate a number of challenges including access to finance and mobilisation of funds (*high confidence*) {2.5.2, 4.4.5}

**D5.2.** Adaptation finance consistent with global warming of 1.5°C is difficult to quantify and compare with 2°C. Knowledge gaps include insufficient data to calculate specific climate resilience-enhancing investments, from the provision of currently underinvested basic infrastructure. Estimates of the costs of adaptation might be lower at global warming of 1.5°C than for 2°C. Adaptation needs have typically been supported by public sector sources such as national and subnational government budgets, and in developing countries together with support from development assistance, multilateral development banks, and UNFCCC channels (*medium confidence*). More recently there is a growing understanding of the scale and increase in NGO and private funding in some regions (*medium confidence*). Barriers include the scale of adaptation financing, limited capacity and access to adaptation finance (*medium confidence*). {4.4.5, 4.6}

**D5.3.** Global model pathways limiting global warming to 1.5°C are projected to involve the annual average investment needs in the energy system of around 2.4 trillion USD<sub>2010</sub> between 2016 and 2035 representing about 2.5% of the world GDP (*medium confidence*). {2.5.2, 4.4.5, Box 4.8}

**D5.4.** Policy tools can help mobilise incremental resources, including through shifting global investments and savings and through market and non-market based instruments as well as accompanying measures to secure the equity of the transition, acknowledging the challenges related with implementation including those of energy costs, depreciation of assets and impacts on international competition, and utilizing the opportunities to maximize co-benefits (*high confidence*) {1.3.3, 2.3.4, 2.3.5, 2.5.1, 2.5.2, Cross-Chapter Box 8 in Chapter 3 and 11 in Chapter 4, 4.4.5, 5.5.2}

**D5.5.** The systems transitions consistent with adapting to and limiting global warming to 1.5°C include the widespread adoption of new and possibly disruptive technologies and practices and enhanced climate-driven innovation. These imply enhanced technological innovation capabilities, including in industry and finance. Both national innovation policies and international cooperation can contribute to the development, commercialization and widespread adoption of mitigation and adaptation technologies. Innovation policies may be more effective when they combine public support for research and development with policy mixes that provide incentives for technology diffusion. (*high confidence*) {4.4.4, 4.4.5}.

**D5.6.** Education, information, and community approaches, including those that are informed by Indigenous knowledge and local knowledge, can accelerate the wide scale behaviour changes consistent with adapting to and limiting global warming to 1.5°C. These approaches are more

effective when combined with other policies and tailored to the motivations, capabilities, and resources of specific actors and contexts (*high confidence*). Public acceptability can enable or inhibit the implementation of policies and measures to limit global warming to 1.5°C and to adapt to the consequences. Public acceptability depends on the individual's evaluation of expected policy consequences, the perceived fairness of the distribution of these consequences, and perceived fairness of decision procedures (*high confidence*). {1.1, 1.5, 4.3.5, 4.4.1, 4.4.3, Box 4.3, 5.5.3, 5.6.5}

**D6. Sustainable development supports, and often enables, the fundamental societal and systems transitions and transformations that help limit global warming to 1.5°C. Such changes facilitate the pursuit of climate-resilient development pathways that achieve ambitious mitigation and adaptation in conjunction with poverty eradication and efforts to reduce inequalities (*high confidence*). {Box 1.1, 1.4.3, Figure 5.1, 5.5.3, Box 5.3}**

**D6.1.** Social justice and equity are core aspects of climate-resilient development pathways that aim to limit global warming to 1.5°C as they address challenges and inevitable trade-offs, widen opportunities, and ensure that options, visions, and values are deliberated, between and within countries and communities, without making the poor and disadvantaged worse off (*high confidence*). {5.5.2, 5.5.3, Box 5.3, Figure 5.1, Figure 5.6, Cross-Chapter Boxes 12 and 13 in Chapter 5}

**D6.2.** The potential for climate-resilient development pathways differs between and within regions and nations, due to different development contexts and systemic vulnerabilities (*very high confidence*). Efforts along such pathways to date have been limited (*medium confidence*) and enhanced efforts would involve strengthened and timely action from all countries and non-state actors (*high confidence*). {5.5.1, 5.5.3, Figure 5.1}

**D6.3.** Pathways that are consistent with sustainable development show fewer mitigation and adaptation challenges and are associated with lower mitigation costs. The large majority of modelling studies could not construct pathways characterized by lack of international cooperation, inequality and poverty that were able to limit global warming to 1.5°C. (*high confidence*) {2.3.1, 2.5.3, 5.5.2}

**D7. Strengthening the capacities for climate action of national and sub-national authorities, civil society, the private sector, indigenous peoples and local communities can support the implementation of ambitious actions implied by limiting global warming to 1.5°C (*high confidence*). International cooperation can provide an enabling environment for this to be achieved in all countries and for all people, in the context of sustainable development. International cooperation is a critical enabler for developing countries and vulnerable regions (*high confidence*). {1.4, 2.3, 2.5, 4.2, 4.4, 4.5, 5.3, 5.4, 5.5, 5.6, 5, Box 4.1, Box 4.2, Box 4.7, Box 5.3, Cross-Chapter Box 9 in Chapter 4, Cross-Chapter Box 13 in Chapter 5}**

**D7.1.** Partnerships involving non-state public and private actors, institutional investors, the banking system, civil society and scientific institutions would facilitate actions and responses consistent with limiting global warming to 1.5°C (*very high confidence*). {1.4, 4.4.1, 4.2.2, 4.4.3, 4.4.5, 4.5.3, 5.4.1, 5.6.2, Box 5.3}.

**D7.2.** Cooperation on strengthened accountable multilevel governance that includes non-state actors such as industry, civil society and scientific institutions, coordinated sectoral and cross-sectoral

policies at various governance levels, gender-sensitive policies, finance including innovative financing and cooperation on technology development and transfer can ensure participation, transparency, capacity building, and learning among different players (*high confidence*). {2.5.2, 4.2.2, 4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.5.3, Cross-Chapter Box 9 in Chapter 4, 5.3.1, 4.4.5, 5.5.3, Cross-Chapter Box 13 in Chapter 5, 5.6.1, 5.6.3}

**D7.3.** International cooperation is a critical enabler for developing countries and vulnerable regions to strengthen their action for the implementation of 1.5°C-consistent climate responses, including through enhancing access to finance and technology and enhancing domestic capacities, taking into account national and local circumstances and needs (*high confidence*). {2.3.1, 4.4.1, 4.4.2, 4.4.4, 4.4.5, 5.4.1 5.5.3, 5.6.1, Box 4.1, Box 4.2, Box 4.7}.

**D7.4.** Collective efforts at all levels, in ways that reflect different circumstances and capabilities, in the pursuit of limiting global warming to 1.5°C, taking into account equity as well as effectiveness, can facilitate strengthening the global response to climate change, achieving sustainable development and eradicating poverty (*high confidence*). {1.4.2, 2.3.1, 2.5.2, 4.2.2, 4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.4.5, 4.5.3, 5.3.1, 5.4.1, 5.5.3, 5.6.1, 5.6.2, 5.6.3}

**Box SPM 1: Core Concepts Central to this Special Report**

**Global mean surface temperature (GMST):** Estimated global average of near-surface air temperatures over land and sea-ice, and sea surface temperatures over ice-free ocean regions, with changes normally expressed as departures from a value over a specified reference period. When estimating changes in GMST, near-surface air temperature over both land and oceans are also used.<sup>19</sup> {1.2.1.1}

**Pre-industrial:** The multi-century period prior to the onset of large-scale industrial activity around 1750. The reference period 1850–1900 is used to approximate pre-industrial GMST. {1.2.1.2}

**Global warming:** The estimated increase in GMST averaged over a 30-year period, or the 30-year period centered on a particular year or decade, expressed relative to pre-industrial levels unless otherwise specified. For 30-year periods that span past and future years, the current multi-decadal warming trend is assumed to continue. {1.2.1}

**Net zero CO<sub>2</sub> emissions:** Net-zero carbon dioxide (CO<sub>2</sub>) emissions are achieved when anthropogenic CO<sub>2</sub> emissions are balanced globally by anthropogenic CO<sub>2</sub> removals over a specified period.

**Carbon dioxide removal (CDR):** Anthropogenic activities removing CO<sub>2</sub> from the atmosphere and durably storing it in geological, terrestrial, or ocean reservoirs, or in products. It includes existing and potential anthropogenic enhancement of biological or geochemical sinks and direct air capture and storage, but excludes natural CO<sub>2</sub> uptake not directly caused by human activities.

**Total carbon budget:** Estimated cumulative net global anthropogenic CO<sub>2</sub> emissions from the preindustrial period to the time that anthropogenic CO<sub>2</sub> emissions reach net zero that would result, at some probability, in limiting global warming to a given level, accounting for the impact of other anthropogenic emissions. {2.2.2}

**Remaining carbon budget:** Estimated cumulative net global anthropogenic CO<sub>2</sub> emissions from a given start date to the time that anthropogenic CO<sub>2</sub> emissions reach net zero that would result, at some probability, in limiting global warming to a given level, accounting for the impact of other anthropogenic emissions. {2.2.2}

**Temperature overshoot:** The temporary exceedance of a specified level of global warming.

**Emission pathways:** In this Summary for Policymakers, the modelled trajectories of global anthropogenic emissions over the 21st century are termed emission pathways. Emission pathways are classified by their temperature trajectory over the 21st century: pathways giving at least 50% probability based on current knowledge of limiting global warming to below 1.5°C are classified as ‘no overshoot’; those limiting warming to below 1.6°C and returning to 1.5°C by 2100 are classified as ‘1.5°C limited-overshoot’; while those exceeding 1.6°C but still returning to 1.5°C by 2100 are classified as ‘higher-overshoot’.

<sup>19</sup> Past IPCC reports, reflecting the literature, have used a variety of approximately equivalent metrics of GMST change.

**Impacts:** Effects of climate change on human and natural systems. Impacts can have beneficial or adverse outcomes for livelihoods, health and well-being, ecosystems and species, services, infrastructure, and economic, social and cultural assets.

**Risk:** The potential for adverse consequences from a climate-related hazard for human and natural systems, resulting from the interactions between the hazard and the vulnerability and exposure of the affected system. Risk integrates the likelihood of exposure to a hazard and the magnitude of its impact. Risk also can describe the potential for adverse consequences of adaptation or mitigation responses to climate change.

**Climate-resilient development pathways (CRDPs):** Trajectories that strengthen sustainable development at multiple scales and efforts to eradicate poverty through equitable societal and systems transitions and transformations while reducing the threat of climate change through ambitious mitigation, adaptation, and climate resilience.

Appointment

---

**From:** Martinich, Jeremy [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=4042067053EB4FEAB35127A0B65E517B-JMARTINI]  
**Sent:** 11/15/2018 4:50:50 PM  
**To:** Wehrum, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=33d96ae800cf43a3911d94a7130b6c41-Wehrum, Wil]  
**Subject:** Accepted: IPCC 1.5C Special Report  
**Location:** WJC - N 5400  
  
**Start:** 11/26/2018 6:00:00 PM  
**End:** 11/26/2018 7:00:00 PM  
**Show Time As:** Busy

Appointment

---

**From:** Irving, Bill [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=7056450189224B4DAF3E399831FB0F8B-BIRVIN02]  
**Sent:** 10/26/2018 4:44:43 PM  
**To:** Wehrum, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=33d96ae800cf43a3911d94a7130b6c41-Wehrum, Wil]  
**Subject:** Accepted: IPCC 1.5C Special Report  
**Location:** WJC - N 5400  
  
**Start:** 11/26/2018 6:00:00 PM  
**End:** 11/26/2018 7:00:00 PM  
  
**Recurrence:** (none)

Appointment

---

**From:** Murphy, Tina [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=03E381B938CD4B279E8DA793984C33F1-MURPHY, TINA]  
**Sent:** 10/26/2018 4:35:50 PM  
**To:** Wehrum, Bill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=33d96ae800cf43a3911d94a7130b6c41-Wehrum, Wil]  
**Subject:** Accepted: IPCC 1.5C Special Report  
**Location:** WJC - N 5400  
  
**Start:** 11/26/2018 6:00:00 PM  
**End:** 11/26/2018 7:00:00 PM  
**Show Time As:** Busy

## Message

**From:** Wehrum, Bill [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=33D96AE800CF43A3911D94A7130B6C41-WEHRUM, WIL]  
**Sent:** 10/12/2018 10:23:03 PM  
**To:** Gunning, Paul [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=f65040017f05429aa05572f096a50463-PGUNNING]  
**CC:** Dunham, Sarah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a9444681441e4521ad92ae7d42919223-SDUNHAM]; Krieger, Jackie [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9b5c0c79be3c4821baf10ab9cf823e82-JKrieger]; Lewis, Josh [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b22d1d3bb3f84436a524f76ab6c79d7e-JOLEWIS]  
**Subject:** Re: IPCC Report on 1.5 degrees

Thanks Paul.

---

Bill Wehrum  
 Assistant Administrator  
 Office of Air and Radiation  
 U.S. Environmental Protection Agency  
 (202) 564-7404

On Oct 12, 2018, at 2:41 PM, Gunning, Paul <[Gunning.Paul@epa.gov](mailto:Gunning.Paul@epa.gov)> wrote:

Bill – I hope all is well. Sarah mentioned that you wanted to get a copy of the IPCC special report on 1.5 degrees . I have attached the pdf version of the final Summary for Policy Makers as well as a link to the IPCCC web site that contains the full contents of the report (broken out by chapter). I have also attached the official USG statement that was delivered by State Department at the IPCC meeting following the approval of the final report.

Please let me know if you have any questions or need any additional information.

Have a great weekend.

Paul

Full Report can be found at:

<http://www.ipcc.ch/report/sr15/>

<sr15\_spm\_final.pdf>

<Statement of the United States of America on the IPCC Special Report on Global Warming of 1.pdf>